DOCUMENT RESUME

ED 196 905 SP 017 401

AUTHOR	Probst, Daniel
TITLE	A Study of Time On-Task in Three Teachers' Classrooms Using Different Instructional Modes. Report from the Project on Studies of Instructional Programming for the Individual Student.
INSTITUTION	Wisconsin Univ., Madison. Research and Development Center for Individualized Schooling.
SPONS AGENCY	National Inst. of Education (DHEW), Washington, D.C.
REPORT NO	WRDCIS-TR-562
PUB DATE	Nov 80
GRANT	OB-NIE-G-80-0117
NOTE	129p.
EDRS PRICE	MF01/PC06 Plus Postage.
DESCRIPTORS	*Academic Achievement; *Achievement Gains; Classroom Environment; Grade 8; *Individualized Instruction; Junior High Schools; *Large Group Instruction; Mathematics Instruction; Secondary School Mathematics; *Small Group Instruction; Teaching Methods; *Time Factors (Learning)

ABSTRACT

This study investigated differences occurring in student time utilization in three teachers' classes. In Class A, the teacher used a large group instructional mode; in Class B, the teacher used a small group instructional mode; and in Class C, the teacher used an individualized instructional mode. The subjects were 60 eighth grade students from a large urban middle school. A time sampling observation system was used to record student time on task, student time off task, and sanctioned noninstructional time. Students completed a locally constructed mathematics test at the end of the study. Scores from this test were used to classify students in one of three achievement levels: high, middle, or low. Results of comparisons performed on time on task indicated that high and middle achievers spent significantly more time on task than low achievers. No difference was found between high and middle achievers. The comparisons also indicated no significant difference in time on task for any one of the three levels compared between any two of the three teachers' classes. No significant differences were found between any two achievement levels for sanctioned noninstructional time. There were three significant comparisons between achievement levels and sets of teachers' classes. The middle achievers in Class A differed from the middle achievers in Class B, the low achievers in Class A differed from the low achievers in Class B, and the low achievers in Class C differed from the low achievers in Class B. (Author/CJ)

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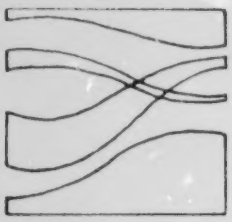

Technical Report No. 562

A Study of Time On-Task in Three Teachers' Classrooms Using Different Instructional Modes

by Daniel Probst

U.S. DEPARTMENT OF HEALTH
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November 1980

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SP 017 404

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A STUDY OF TIME ON-TASK IN THREE TEACHERS' CLASSROOMS USING DIFFERENT INSTRUCTIONAL MODES

by

Daniel Probst

Report from the Project on
Studies of Instructional Programming for the Individual Student

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November 1980

FEB 2 1981

This Technical Report is a doctoral dissertation reporting research supported by the Wisconsin Research and Development Center for Individualized Schooling. Since it has been approved by a University Examining Committee, it has not been reviewed by the Center. It is published by the Center as a record of some of the Center's activities and as a service to the student. The bound original is in the University of Wisconsin Memorial Library.

The project presented or reported herein was performed pursuant to a grant from the National Institute of Education, Department of Health, Education, and Welfare. However, the opinions expressed herein do not necessarily reflect the position or policy of the National Institute of Education, and no official endorsement by the National Institute of Education should be inferred.

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The Wisconsin Research and Development Center is supported with funds from the National Institute of Education and the University of Wisconsin.

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ACKNOWLEDGEMENTS

I wish to thank Dr. Herbert J. Klausmeier, my major professor, for his guidance and support during my graduate studies and in the writing of this thesis. I am also grateful to Dr. Penelope Peterson and Dr. Ronald Serlin for serving on the examining committee.

Appreciation is extended to Dr. Hee Doe Lee, Dr. James Lipham and Dr. Russell Ziemer for their concern and valuable assistance in the planning and running of this study. Further thanks are also due to the following friends and co-workers for sharing in some manner to the success of this endeavor: Ray Buss, Mary Brady, Jeff Dunstan, Jim and Sandy Erickson, Robb Rankin, and Gail Thierbach.

I am deeply indebted to Julie McGivern, my office-partner and confidant, for helping in conducting interrater measures for this study. I wish to thank Julie also for the personal and professional moments we shared the past year.

To my parents, James and Marion Probst I am very thankful for their love and support during this period of my life.

Finally, my greatest debt of gratitude goes to my sister and brother, Stephanie and John Daresh for providing the encouragement and facilitative environment necessary to carry out and complete this portion of my graduate studies.

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ABSTRACT

This study investigated differences occurring in student time utilization in three teachers' classes. In Class A the teacher used a large-group instructional mode, in Class B the teacher used a small-group instructional mode, and in Class C the teacher used an individualized instructional mode. The subjects were 60 eighth-grade students drawn from three teachers' mathematics classes in a large urban middle school. A time sampling observation system was used to record student time on-task, time off-task, and sanctioned non-instructional time. Students completed a locally constructed mathematics test at the end of the study. Scores from this test were used to put students in three achievement levels.

Results of pairwise planned comparisons performed on time on-task indicated that high and middle achievers spent significantly more time on-task than low achievers. No difference was found between high and middle achievers. The pairwise comparisons also indicated no significant difference in time on-task for any one of the three levels compared between any two of the three teachers' classes. The second dependent variable tested was sanctioned non-instructional time. No significant differences were found between any two achievement levels for sanctioned non-instructional time. There were three significant comparisons between achievement levels and sets of teachers' classes. The middle achievers in Class A differed from the middle achievers in Class B, the low achievers in Class A differed from the low achievers in Class B, and the low achievers in Class C differed from the low achievers in Class B.

CHAPTER I

INTRODUCTION

The most fundamental view held of schooling is that student learning is directly related to what is taught and how it is taught in the classroom. It is also clear that children differ greatly in their rates of learning, general interests, receptivity for learning, and learning styles. Numerous secondary schools, however, have not increased student learning in basic skills or provided effectively for individual differences in learning. Secondary schools need to undertake renewal and improvement efforts that are directed at adapting instructional settings and teaching practices to meet the learning characteristics of each student (NISE Commission, 1974).

A comprehensive educational system that has been developed to provide schools with a strategy of educational programming to meet the needs and characteristics of the individual student is found in the conceptual framework underlying Individually Guided Education (IGE) (Klausmeier, 1977; Klausmeier, Morrow, & Walters, 1968). Chase (1977, p. xi) noted that successful implementation of this system (IGE) at the elementary school level resulted because it was an educational strategy which "...offers distinctive patterns for the organization and management of instruction and learning environments..."

Since 1977, an innovative design of secondary education based on educational programming for the individual student has been under continuous development at the Wisconsin Research and Development Center for Individualized Schooling. This theoretical design, a part of the Wisconsin Program for the Renewal and Improvement of Secondary Education (WRISE), under the direction of Herbert J. Klausmeier, "represents an attempt to strengthen successful innovative practices and to promote continuous educational improvement and renewal" (Klausmeier, 1980a., p. 20).

The design focuses on 10 major components which indicate directions that a secondary school staff may pursue to improve the quality of education of individual students (Klausmeier, 1980a, 1980b). Each component is accompanied by a comprehensive objective which deals with a major aspect of secondary education (See Appendix A). The primary component of the design is Educational Programming for the Individual Student which consists of two closely related aspects. First, the student and student's advisor plan a total educational program for the student each semester that includes all the students courses and other educational activities. Secondly, at the beginning of each course that is part of the student's educational program, an individual instruction program is planned by the student and the teacher that takes into account the student's aptitudes, learning styles, interests, motivation, career goals, and other personal and social characteristics.

A seven-step model of instructional programming for the individual student (IPM) has been developed to guide secondary staffs in arranging an appropriate instructional program for students (Klausmeier, 1980b, 1975; Klausmeier, Quilling, & Sorensen, 1971). As shown in Figure 1, Step 5 of this model presents several learning conditions to be varied when providing an individual educational program for each student. The conditions that are necessary to vary are:

a. the amount of time the student spends to achieve his/her objectives,

b. the amount of individual attention and direction by the teacher,

c. the amount of time the student spends in interaction with other students,

d. the use of printed materials, audiovisual materials, and direct experiencing of phenomena,

e. the use of space and equipment (media),

f. the amount of time the student spends in both student-initiated and teacher-directed individual, pair, small-group, and large-group activities.

However, information on these conditions as applied in secondary schools is lacking. A thorough appraisal (Step 5) is needed.

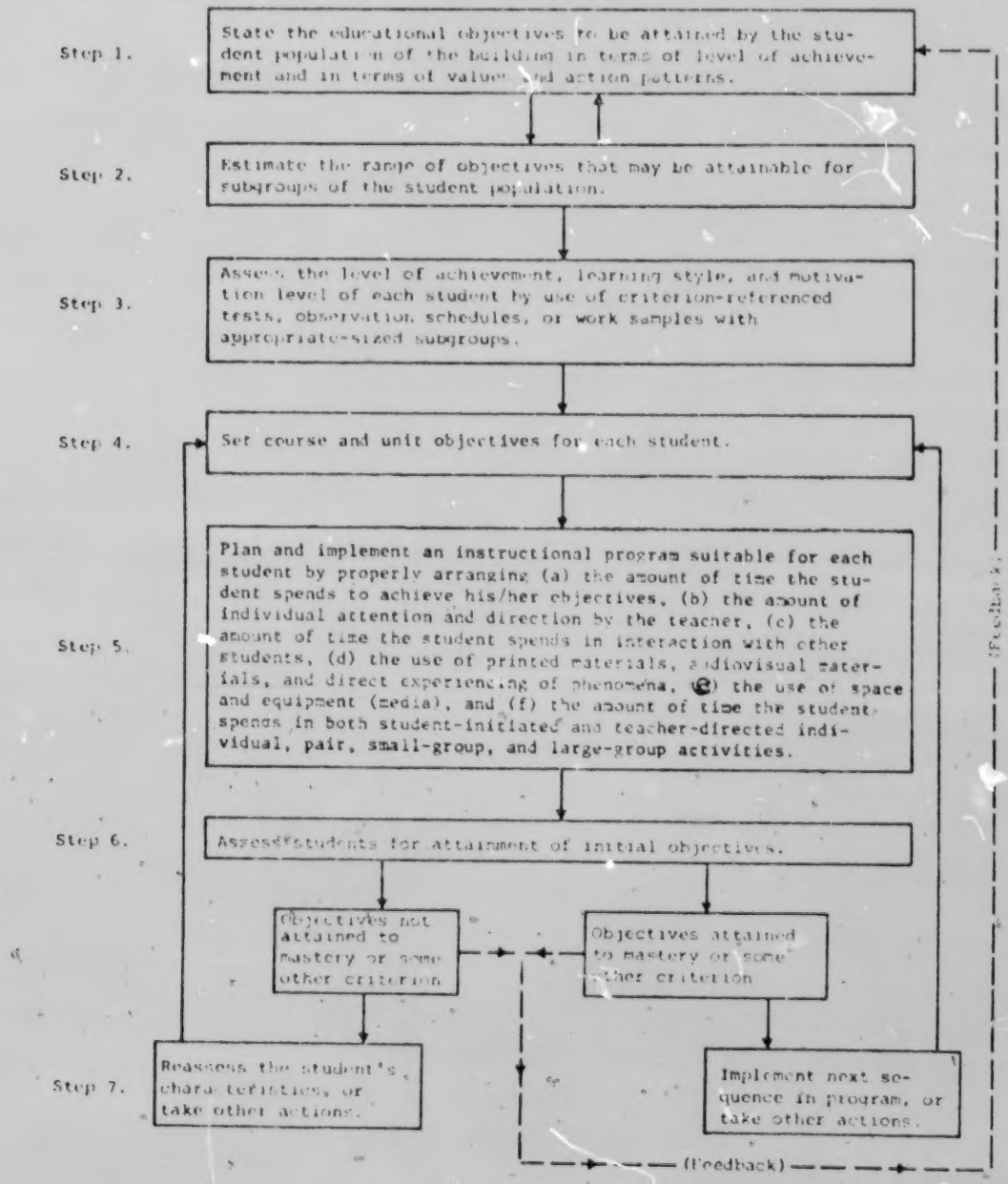

Step 1.
State the educational objectives to be attained by the student population of the building in terms of level of achievement and in terms of value and action patterns.
Step 2.
Estimate the range of objectives that may be attainable for subgroups of the student population.
Step 3.
Assess the level of achievement, learning style, and motivation level of each student by use of criterion-referenced tests, observation schedules, or work samples with appropriate-sized subgroups.
Step 4.
Set course and unit objectives for each student.
Step 5.
Plan and implement an instructional program suitable for each student by properly arranging (a) the amount of time the student spends to achieve his/her objectives, (b) the amount of individual attention and direction by the teacher, (c) the amount of time the student spends in interaction with other students, (d) the use of printed materials, audiovisual materials, and direct experiencing of phenomena, (e) the use of space and equipment (media), and (f) the amount of time the student spends in both student-initiated and teacher-directed individual, pair, small-group, and large-group activities.
Step 6.
Assess students for attainment of initial objectives.
Objectives not attained to mastery or some other criterion
Objectives attained to mastery or some other criterion
Step 7.
Reassess the student's characteristics, or take other actions.
Implement next sequence in program, or take other actions.
(Feedback)
(Feedback)

Figure 1. Instructional Programming Model (Klausmeier, Lipham, & Daresh, 1980, p. 60).

Background of the Problem to be Investigated

Successful implementation of the instructional programming model in secondary schools requires numerous conditions of learning to be met (Step 5, Figure 1; Klausmeier, 1976). However, the interaction of these learning conditions with actual student performance is not fully understood at the secondary school level. Research directed at isolating and studying the conditions in the regular classroom setting is needed.

The primary purpose of investigations on classroom processes should be to describe what the student does in the classroom (Rosenshine, 1979). Jackson (1968) noted that observations of this nature would also be useful for relating to teachers more effective ways in which to manage learning rather than prescribing ways in which to manage students.

The present study was concerned with classroom time utilization by individual eighth grade students in selected mathematics classes. Specifically, the study focused upon two learning variables which are related to implementing Step 5 of the generic model of instructional programming for the individual student (IPM). The principle dependent variables to be examined in this study were:

1. The amount of time that students of high, middle, and low mathematics achievement spent in time on-task.
2. The amount of time spent on-task by students of three achievement levels in individual study, adult-led-or-student-led small group activities, and adult-led large group instruction.

Purpose and Hypotheses of the Study

The purpose of this study was to investigate differences in classroom time utilization by eighth grade students of three selected mathematics classes. The following specific results were hypothesized:

1. There will be no significant difference in time on-task between each pairs of achievement levels: high and middle, high and low, and middle and low.
2. For the high achievement level group, there will be no significant difference in time on-task between each set of teachers' classes--Class A: large-group mode, Class B: small-group mode, and Class C: individualized mode.
3. For the middle achievement level group, there will be no significant difference in time on-task between each set of teachers' classes--Class A: large-group mode, Class B: small-group mode, and Class C: individualized mode.
4. For the low achievement level group, there will be no significant difference in time on-task between each set of teachers' classes--Class A: large-group mode, Class B: small-group mode, and Class C: individualized mode.

In addition, four hypotheses which provided further information on how students spent time in the classroom were tested:

5. There will be no significant difference in sanctioned non-instructional time between each of the pairs of achievement levels: high and middle, high and low, and middle and low.
6. For the high achievement level group, there will be no significant

difference in sanctioned non-instructional time between each set of teachers' classes--Class A: large-group mode, Class B: small-group mode, and Class C: individualized mode.

7. For the middle achievement level group, there will be no significant difference in sanctioned non-instructional time between each set of teachers' classes--Class A: large-group mode, Class B: small-group mode, and Class C: individualized mode.
8. For the low achievement level group, there will be no significant difference in sanctioned non-instructional time between each set of teachers' classes--Class A: large-group mode, Class B: small-group mode, and Class C: individualized mode.

CHAPTER II

REVIEW OF THE LITERATURE

In this chapter is a review of the literature related to the present investigation.

Time and Models of School Learning

The first conceptual model of schooling to assess the degree of student learning as a function of time spent in task master, was proposed by Carroll (1963). In its simplest form, the model implies that given enough time to learn, all students would attain mastery of the learning task. The degree to which a particular student learns a given task is expressed by the formula:

$$\text{Degree of School Learning} = f\left(\frac{\text{time spent}}{\text{time needed}}\right)$$

The formula means that the degree of learning by a student is a function of the time the student spends on a task in relationship to the time that is needed for mastery of the task. Carroll also noted that the learning of the task is influenced by the interaction of learner characteristics and the characteristics of instruction.

He hypothesized that the student's aptitude, his ability to understand instruction, and the quality of instruction determine the amount of time needed by the student to learn a given task. The amount of time that a student spends actively engaged in learning is a function of opportunity (classroom time allocated to learning) and perseverance (the amount of time that the student is willing to spend in learning). The

expanded Carroll Model, which includes these variables, is represented as follows:

$$\text{Degree of School Learning} = f\left(\frac{\text{1. Perseverance} \quad \text{2. Opportunity to learn}}{\text{3. Aptitude} \quad \text{4. Quality of instruction}}\right)$$

5. Ability to understand instruction

According to this formula, the extent to which a learning task is mastered is dependent on the student's perseverance and the opportunity to learn, relative to the student's aptitude, the quality of instruction, and the student's ability to understand instruction.

Carroll did not define the amount of time that different students need to master the same tasks. The model suggests, however, that if a teacher could control for the opportunity to learn, students' aptitudes, quality of instruction, and students' ability to understand instruction, then perseverance (time engaged on-task) by itself would indicate the degree of student learning. Hypotheses related to time needed could evolve from this point.

The theory of school learning proposed by Bloom (1968, 1976) was much influenced by Carroll's work (Figure 2). Bloom hypothesized that if students in a classroom were normally distributed according to aptitudes, but the quality of instruction and allocated learning time were adjusted to take into account the characteristics and needs of each learner, then most students would achieve mastery of the learning task. In this regard, a teacher would be able to ensure that each student had attained a

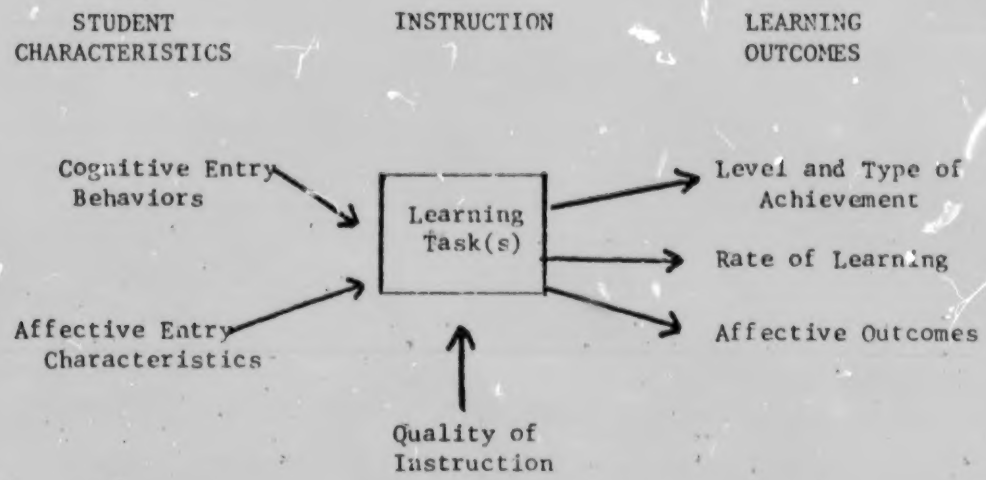


Figure 2. Bloom's Theory of School Learning
Source: Bloom, B.S. Human characteristics and school learning. New York: McGraw-Hill, 1976, p. 11.

mastery level by pairing allocated time for learning with appropriate quality of instruction.

Bloom (1976) also identified characteristics of students, instruction, and learning outcomes which account for much of the variance in school learning. Central to this model is that variations in (1) Cognitive Entry Behaviors (prerequisite learning necessary for learning new tasks), (2) Affective Entry Characteristics (the student's motivation to learn new tasks), and (3) Quality of Instruction (the extent to which cues, practice, and reinforcement of learning are appropriate to the different students) will determine the amount of learning.
Bloom concluded that the degree to which these variables differ for the individual is important in determining the student's final level of achievement, the time and effort expended in learning, and the individual's perception of self.

Harnischfeger and Wiley (1975) proposed that student learning is a function primarily of the quantity of schooling the student receives. However, as with Carroll's model, they acknowledge that numerous other variables, such as individual student characteristics, teacher characteristics, and quality of instruction may influence learning.

Within the dotted lines of Harnischfeger and Wiley's model (Figure 3) are presented the time concepts of exposure to schooling. Maximum Quantity of schooling is defined by the length of the school year and the length of the school day. This sets the upper limit on time available to the student for school learning. Total Allocated Exposure Time (1) is the amount

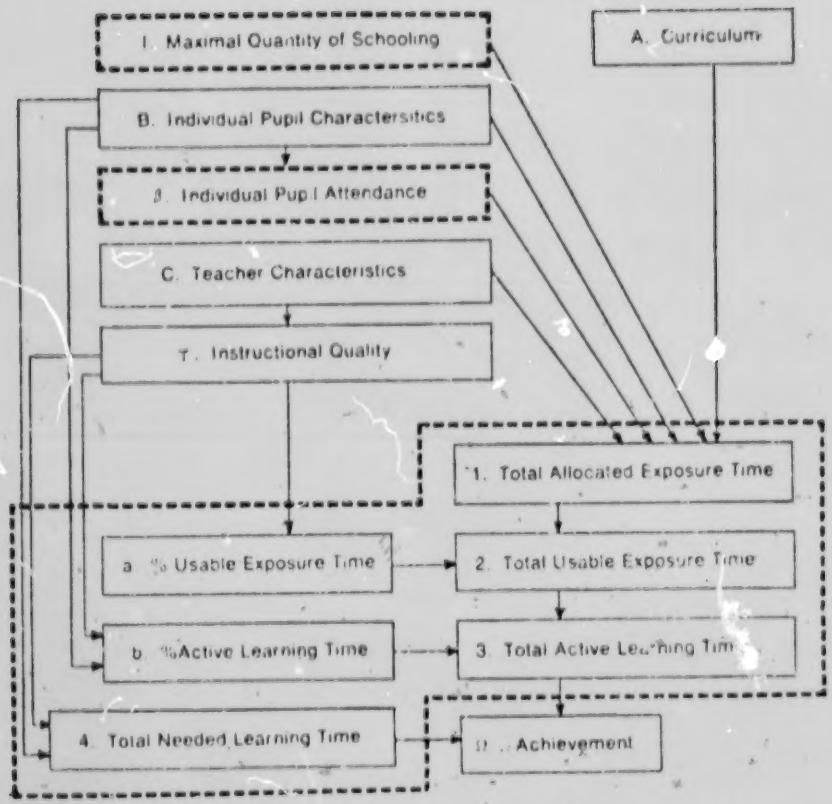

I. Maximal Quantity of Schooling
A. Curriculum
B. Individual Pupil Characteristics
β. Individual Pupil Attendance
C. Teacher Characteristics
T. Instructional Quality
1. Total Allocated Exposure Time
a. % Usable Exposure Time
2. Total Usable Exposure Time
b. %Active Learning Time
3. Total Active Learning Time
4. Total Needed Learning Time
D. Achievement

Figure 3. Harnischfeger & Wiley's (1975) Individual Instructional Exposure and Achievement Model

Source: Harnischfeger, A. & Wiley, D. The teaching-learning process in elementary schools: A synoptic view. Studies in Educational Processes, 9, University of Chicago, 1975.

of time that the teacher has assigned for instruction. However, disciplining students or organizing students into work groups limits the amount of allocated time usable for instruction (a.). Thus, the time actually devoted to teaching (2.) is the product of Total Allocated Exposure Time minus the percent of usable time (a.). The percent of the instructional period that the student spends in active learning (b.) is the ratio of time spent in active learning (3.) to the total amount of usable time (2.).

Student achievement in this model is directly determined by only the total amount of time the student needs to learn (4.) and the total amount of time the student has given to learning (3.). The other time variables and the rest of the factors presented in the model are mediated through these two variables. Harnischfeger and Wiley noted that it is unclear the extent to which the factors outside the dotted lines influence the four main time concepts.

Bennett (1978) modified Harnischfeger and Wiley's model and added a feedback loop (Figure 4). In this model, student achievement is the direct result of how effectively the student comprehends the assigned material (total content comprehended). The feedback loop is an additional element which the teacher may use to manipulate the amount of time the student will spend on a task and the amount of content which can be comprehended in that time. As with previous models, Bennett suggests that student achievement is indirectly related to the total amount of time that the teacher has allocated to a subject area.

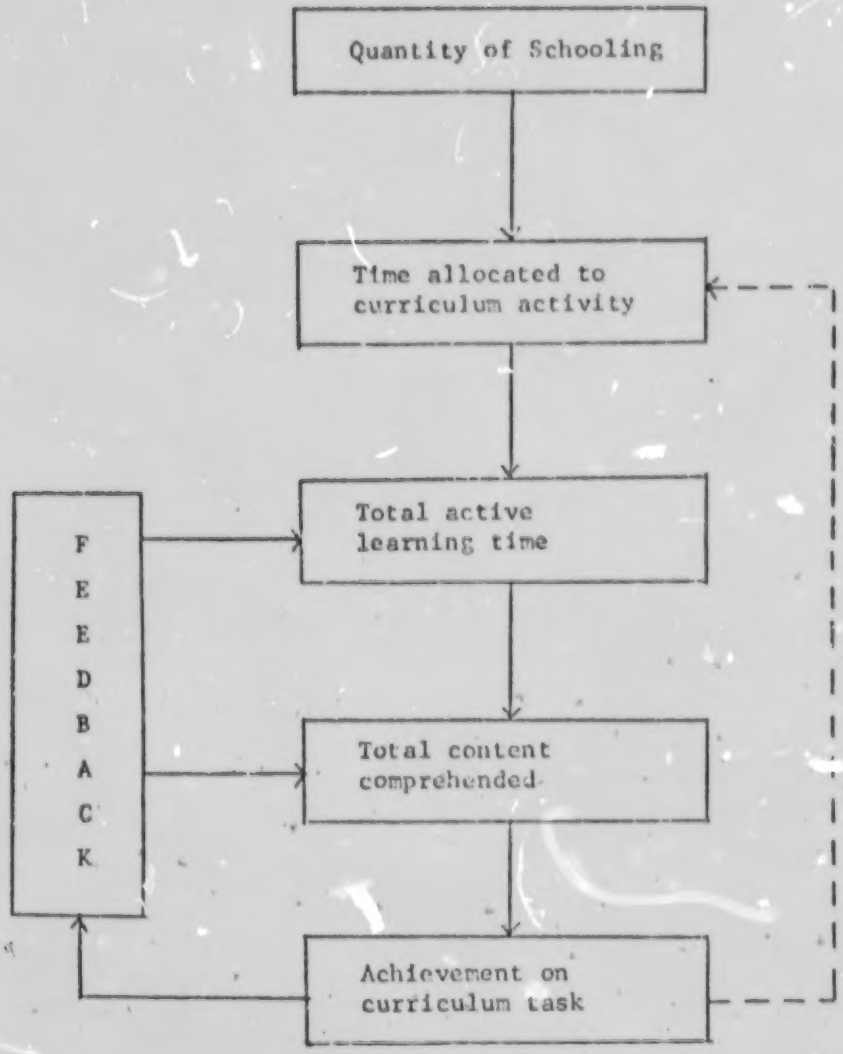
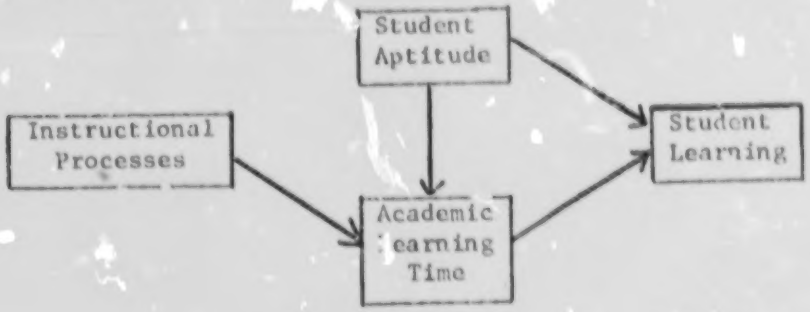


Figure 4. Model relating pupil activities to achievement.

Source: Bennett, N. Recent research on teaching: a dream, a belief, and a model. Journal of Education, 1976, 160(3), 8.

A final model of schooling that involves time and students' activities is Academic Learning Time (ALT) (Marliave, Fisher, & Dishaw, 1977). The model of Academic Learning Time is based on the underlying principle that learning is a result of what the student does in the classroom. The model, as depicted below, involves three basic components; student engagement, intermediate task difficulty and task relevance.



A distinction is made in the Beginning Teacher Evaluation Study (BTES) research between student engagement and teacher's allocation of learning time (Marliave, et al., 1977). Engagement is the active involvement of the student in learning. The teacher's allocated time sets the limit for student engaged time. In this regard, the teacher allocates a specific period of time for the students to work on an activity. There may be vast differences between the amount of time the teacher has allocated and the amount of time that the students spend engaged for an entire class, or across individual students in the class. Intermediate difficulty means that a student must have minimal comprehension of a task

in order to learn effectively. On the other hand, if the task is too easy, learning is also impaired. Task relevance is simply the content category to which ALT is directed. For example, BTES studies were limited to ALT involving tasks which were related to reading and mathematics.

The instructional processes of the ALT model focus on five interrelated teacher functions. Diagnosis, prescription, presenting, monitoring, and feedback (See Figure 5). Instruction begins with the planning phase with the teacher assessing the student's current knowledge, skill levels, strengths and weaknesses (diagnosis). Then appropriate instructional activities and methods for teaching are decided upon (prescription). The interaction phase begins with the presentation of the task to the student. The student responds in some manner to the task and the teacher monitors the student's program. Monitoring allows the teacher to assess the extent of the students achievement of the instructional goal. The teacher than may provide feedback to the student, or cycle back to the diagnosis and planning stages for remediation of deficits or move on to new instructional tasks. The ongoing examinations of student ALT and teaching functions allow the teacher to decide where learning breaks down. The information gathered from this process may then be used to make appropriate changes to improve active student participation in learning.

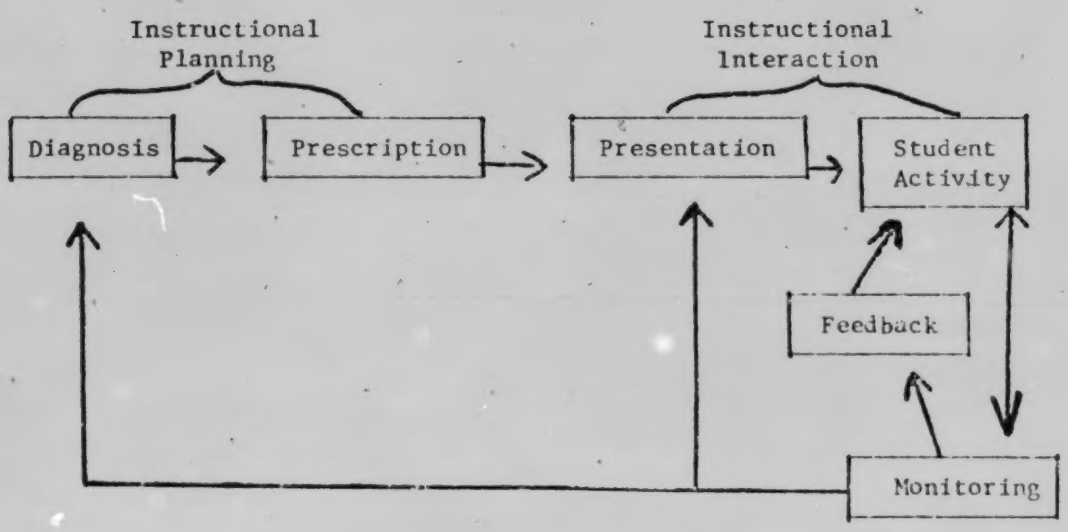


Figure 5. Instructional Functions of the Academic Learning Time Model

Source: Marliave, R. et al., Academic learning time and student achievement in the A-B period. Technical report V-1A, San Francisco: Far West Laboratory, 1977, p. 6.

This section considered various models of school learning which focus on time and what the student is doing in the classroom. The models are common in their attempts to distinguish between the "time needed" (opportunity, time allowed) and "time spent" (perseverance, active learning time) for a particular student in task learning.

Allocated Time and Time On-Task

Allocated time (opportunity to learn or exposure to learning) is defined as, "a function of teacher behavior, the assignment of a given activity to a specified period of student time...it generally sets the limit for student engaged time in a particular activity" (Marliave, et al., 1977). Typically, research on allocated time has attempted to equate the quantity of schooling the student received for a year, day, or class with the student's achievement.

Fowler (1977) found in an informal interview of schooling that the number of hours per year in which elementary age children were exposed to instruction had dropped from 1,000 hours in 1957 to 900 hours in 1977, but the knowledge and skill level demanded of the students had increased in two decades. He concluded that effective classroom time had decreased in the schools.

Smith (1978) investigated the relationship between time allocated to social studies instruction and student achievement of 91 fifth-grade classes in Maryland. During the study, 2,275 students were administered

the STEP achievement test (social studies). Data for allocated time was gathered from teachers' daily schedules. The 91 teachers, as a combined group allocated an average total of 30 minutes per day to social studies instruction. It was found that students in classes above the mean in allocated time were significantly higher on the achievement measure than students from classes of lower allocated instructional time ($p < .05$).

Wiley and Harnischfeger (1974) applied their model of exposure to schooling to compare United States schools (1969-1970) on the quantity of schooling offered in comparison to student achievement. It was found that the number of days per year that various states set as a school year ranged from a low of 172.6 days per year in Vermont to a high of 182.9 days per year in Maryland. Students in Maryland were offered 10.1 days or 5.9 percent more schooling per year than students in Vermont. Wiley and Harnischfeger hypothesized from their model of schooling that in 1969-1970, students in Vermont gained an average of 17 percent less in reading comprehension than students in Maryland.

The researchers then applied Coleman's (1966) data on forty Detroit schools to their model. The schools ranged from 710 to 1,150 hours per year in exposure to schooling. Wiley and Harnischfeger selected from each school a sample of sixth grade classes and analyzed student achievement on three outcome measures: verbal ability, reading comprehension, and mathematics. Three background variables were used to mark the students' prior characteristics: race, number of possessions in the household, and the number of children living in the home.

A school-level regression analysis was set up comparing student achievement to the number of hours allocated for instruction in each school per year. Adjustments were made for the students' prior characteristics. Results indicated that the regression coefficient for verbal ability was 9.58, for reading comprehension 9.57 and for mathematics achievement, 4.08. The researchers concluded that in schools were students received 24 percent more schooling, the students' average gain in reading comprehension increased by two-thirds and their gain in mathematics and verbal skills by one-third.

Few studies of allocated time have described student engagement or time on-task in learning. The models of schooling reviewed earlier suggested that time on-task (time spent on active learning) represents an important educational variable for measuring student learning. However, the problem that confronts the researcher investigating time on-task is that whereas allocated time is a school or teacher controlled variable, a set unit of time which can be easily manipulated, time on-task is characteristic of student behavior, a variable less susceptible to control.

The following research efforts represent a variety of methods used for describing and measuring the relationship among allocated time, time on-task and student achievement. The conclusions which may be drawn from the findings of these studies will be equally as varied.

Bloom (1976) summarized the results of 20 studies of classroom situations which included measures of time on-task (participation). The student sample for these studies ranged from first graders to adults.

In 18 cases, researchers used observer ratings to measure student attending behaviors. In 10 instances, standardized tests were used to measure student achievement, the remaining studies relied upon criterion referenced tests to measure achievement.

Bloom surmised from the reported data that when the class was the unit of study, the correlation between time on-task and achievement gains or final achievement equalled +.27. In those studies where the individual student's time on-task was important, the correlation with final achievement was +.42, while gains in achievement was +.58. It was concluded by Bloom from these findings that over twenty percent of the variation in achievement of individuals is accounted for by their participation in the learning process.

A preliminary study of the IGE Evaluation Study Phase IV (Webb & Nerenz, 1980) investigated allocated time, student engaged time, and achievement in 14 elementary mathematics classes. Six second-grade students from each of eight elementary schools (N=48) and six fifth-grade students from each of six elementary schools (N-36) formed the sample for the study. Allocated time was calculated from daily teacher logs. Information on classroom activities and engaged time was obtained through a time sampling observation system developed by Webb (1979). Trained observers rated each target group of six students in each school once a week for 25 weeks. Student achievement for each grade was derived from the administration of domain referenced tests.

Findings of the study revealed that daily allocated time for the second grade classes ranged from 23 to 47 minutes per day. Second grade Ss ranged in time on-task from 57 percent to 82 percent of the allocated time. Teacher allocated time at the fifth grade level ranged from 32 to 50 minutes. Student time on-task in the fifth grade ranged from 60 percent to 83 percent of the allocated time. Although all Ss in each grade and each school showed gains in achievement, the authors were unable to relate the gains directly to allocated time or student time on-task.

In a study of eight elementary teachers using Direct Instruction (a teacher-led large group approach), Wiley and Harnischfeger (1976) reported that reading achievement of fifth graders was not related significantly to allocated time or student time on-task. Time on-task was gathered on the 188 Ss by trained observers using an observation instrument developed by BTES (Marliave, et al, 1977). The Ss in each class (class size ranged from 26-32 students) were observed once a week over a 10-week period. Teachers were instructed to keep daily logs, recording the amount of time they allocated each day to reading. Ss achievement in reading was assessed through pretest and posttest instruments developed by BTES. Findings indicated that teacher allocated time ranged from .953 to 2.235 hours per day in reading. Student time on-task, as recorded in teacher logs and according to observer ratings, equalled 65 percent. Analysis of results revealed that there existed a negative correlation (-.17) between the pre-test and posttests measures. The researchers concluded that the pretest achievement scores were the best indicators of students' reading gains.

A comprehensive ten-week study of Academic Learning Time (ALT) was conducted by Marliave, Fisher, and Dishaw (1977). ALT was examined along with the reading and mathematics achievement of 25 second grade classes (Ss=139) and 21 fifth grade classes (Ss=122). Teacher daily logs, observer ratings and achievement measures were examined to answer the question, "Do students who spend more time engaged in a content area also show higher achievement in that area?"

Raters observed each class for a full day, and each class was observed a total of five times. The observation system, developed by BTES (Marliave, et al., 1977), was a time-based, rotating sample procedure which permitted the recording of an event for a target student each four minutes. Interrater reliability was established using Winer's reliability measurement for an unadjusted single observation. Rater agreement for second grade time on-task averaged r=.61 and for fifth grade, r=.53. The amount of time on-task reflected only the proportion of allocated reading and mathematics time during which the students were engaged. Allocated reading time and mathematics time were defined to exclude general management activities by the teacher, time required for transitions from one activity to another, and "down time" during which no activity was provided. Allocated time was ascertained by checking teacher logs and also the rater data. Student achievement in mathematics and reading was measured using tests constructed by BTES.

It was found that second grade teachers allocated an average of 45 minutes per day to each mathematics and reading instruction. During these periods, second grade Ss averaged 70 percent of the time on-task. Fifth grade teachers allocated an average of 46 minutes per day to each reading and mathematics instruction. Fifth grade Ss were on-task an average of

70 percent of the time as well. Seven multiple regression analyses were performed on the time and achievement measures.

The research question for the second grade mathematics achievement was tested using seven multiple regression analyses, none of which was significant ($p < .10$). Six regressions were performed on second grade reading, three of which were significant at $p < .01$. In fifth grade achievement, six regressions were undertaken, and no time variables were found to be significant ($p < .01$). However, for fifth grade mathematics, ten regressions were performed. Of these, six were found to be significant ($p < .01$). It was concluded that, in second grade reading and fifth grade mathematics, time variables accounted for one to 18 percent of the variance in posttest achievement. Overall, however, the study did not demonstrate the effect of time on-task, nor did it show a correlation between allocated time and student achievement. It was concluded by the researchers that the teacher kept logs were more accurate measures of student time utilization and achievement than the rater observation system used.

Good and Beckerman (1978) described the amount of time that students of high, middle, and low abilities spent on-task in self-contained classrooms. Sixth grade students from three classrooms in each of two schools were observed by trained coders. Raters demonstrated agreement of $r=.85$ on coded categories, each coder collecting 14 hours of observations in each class.

Findings from rater observations indicated that on-task behavior for high achievers averaged 75 percent of the time, middle achievers averaged 73 percent, and low achievers averaged 67 percent. On-task time across individual classes ranged from 60 to 82 percent. Data were not reported

of the number of subjects in each class or how achievement levels were derived.

Others have examined school learning and the number of trials required for a student to complete a task or unit of work to criterion level. The relationship between the number of trials (Time to Learn), student IQ, and achievement was studied by Gettinger and White (1977). The Ss, 153 fourth, fifth, and sixth graders were observed on the number of trials it took them to reach criterion on single units of material from six academic areas--vocabulary, spelling, mathematics concepts, math computation, reading comprehension, and reading facts. The Ss were administered the Lorge-Thorndike IQ Test and the the SRA Achievement Test, Form C, or the Stanford Achievement Test, Form A.

The number of trials was the strongest negative correlate with achievement (-.85 to -.89). The correlations were somewhat lower between the number of trials and IQ (-.59 to -.69) and between IQ and and achievement (+.59 to +.76). Gettinger and White concluded that the number of trials to criterion was a better predictor of school learning than was IQ. It was suggested that the number of trials to criterion measure is a useful tool for teachers to use who design individual instructional programs to measure student performance.

Wang (1979) suggested the value of allowing students to allocate instructional time for working on certain content areas. The study examined on-task behavior, units completed, and time as they were related to achievement by 21 second grade students in an individualized mastery learning program (Individually Prescribed Instruction). During a five-week baseline period, the school day was arranged by teachers into instructional blocks.

The Ss were instructed to work on mathematics and spelling only in designated block periods. Students received the same number of daily assignments for each subject and were allocated the same amount of time. Two observation systems developed by Wang were used to record teacher activities (Teacher Behavior Observation System, TBOS), and student activities (Student Behavior Observation System, SBOS).

During the five-week experimental phase, an instructional learning management system, the Self-Schedule (SSS), developed by Wang, was implemented. The system was designed as an intervention strategy to facilitate better usage of student and teacher time by making students more responsible for managing instruction. The system allowed students to decide when and what they would work on. Students were asked to keep a record of the amount of time that they spent on various blocks of instruction.

Wang found that under the Self Schedule System, Ss completed more tasks ($p < .01$) in less time ($p < .01$) and exhibited more time on-task ($p < .05$) than in the baseline period. Student time on-task during the baseline period had averaged 73 percent, in the experimental condition students were on-task an average of 84 percent of the time. It was concluded that students in an individualized instructional program (IPI) are capable of effectively allocating time and managing learning by themselves.

Studies on time on-task are inconclusive. Allocated time is a learning variable which allows one to make broad generalizations about its effect on student learning (Bennett, 1978; Fowler, 1977; Smith, 1978; Stallings, 1975). It seems logical, however, that time on-task should have a stronger positive correlation with achievement than allocated time (Bloom, 1976; Wang, 1979; Webb & Nerenz, 1980). More descriptive

studies are needed on the number of academic-engaged minutes that occur in schools (Rosenshine, 1979). This is particularly true at the secondary level were few studies have reported on the amount of allocated time or time on-task that occurs.

Grouping Students for Instruction

Weissglass (1977) noted, "references to the 'vast' research literature on class size are many times more frequent than the actual number of studies." Furthermore, the majority of studies describing instructional grouping patterns in schooling focus on topics of student cooperation, discipline, or affective outcomes (Forehand & Ragosta, 1976; Kounin, 1970; Sulzer, 1972). There is a paucity of research which establishes the relationship among time, instructional grouping patterns, and student achievement. In this regard, the following represents a selected review of the limited literature.

Rosenshine (1977) concluded from research findings in elementary schools that, "Direct Instruction (teacher-led-large group activity) leads to student achievement gains and that a high level of time on-task is a major characteristics of such instruction." However, other reviews on student learning maintain that individualized classroom settings will result in high achievement (Bloom, 1976; Romberg, 1977). Hunsaker and Roy (1978) are highly critical of individualized and traditional large group approaches to instruction.

They determined from their experiences as teachers that nine-member small-group centered classrooms allow for mutuality of task that students of individualized or traditional classes are excluded from doing. Teachers in group-centered approaches remain an integral

part of the group, they facilitate rather than direct instruction, and are concerned with working toward establishing a variety of helping relationship with students. Hunsaker and Roy concluded the key element of small-group instruction is that one learns about self through groups. Hart (1975) also found that 8 to 10 member small groups can be used effectively in teaching cognitive phases of social sciences. Others, however, suggest that groups smaller than 8-members are more adaptable to certain activities.

Davidson (1978) found that mathematics could be taught to junior high school students best through four-person groups of either heterogeneous or homogeneous abilities. In groups of this size, blackboard activities could be easily assigned. Heron (1977) studied the effect of various seating arrangements on student attending behavior and undesirable acting out behavior. The dependent variables were measured by trained observers using a 10 second interval time-sample device developed by the researcher. The Ss, 264 second graders from 24 classes, were observed when arranged into rows, whole-class horseshoes, and cluster groups of four students each. No significant differences ($p < .05$) were found among seating arrangements and the dependent measures of attending and acting out behaviors.

In the Good and Beckerman study reported earlier, an attempt was made to describe proportion of time teachers allocated to different instructional settings and the level of pupils' time-on task in the different approaches. It was found in the six classes observed that individualized seatwork, the student seated at his/her desk (writing), accounted for 38 percent of the total activity in the classes. Sixteen

percent of the time, students were coded as engaged in a whole-class setting, listening to the teacher lecture. In the next highest activity, eight percent of the time students were engaged in large-group teacher-led activities. Students spent two percent of the total instructional time waiting for assistance from the teacher, student teacher, or class aide. Pupil time on-task in the study was greatest in small-group teacher-led activities (82 percent), involvement on-task was lowest in the whole class and large-group settings with the student teacher or the aide leading instruction (66 percent).

Nerenz and Webb found that in 11 of 14 classes observed that individualized activity accounted for the greatest proportion of instructional time (51-99 percent). In three instances, large-group teacher-led activities accounted for a considerable amount of instructional time (50-62 percent). The highest rate of student time on task at the second grade level occurred in an individualized setting (82 percent), the lowest on-task rate (57 percent) was also in the individualized setting. At the fifth grade level, the highest student on-task rate (83 percent) occurred in the teacher-led large-group setting, the lowest rate (60 percent) occurred in an individualized setting. In all classes, the students writing with a pencil on paper accounted for the largest proportion of time for describing students activities in each instructional setting and engagement level (84 percent).

Studies have been unable to establish an "optimal" instructional setting or teacher approach for improving student learning. Hirisch (1976) reviewed thirty-three studies at the secondary level which compared individualized mathematics instruction to group-based methods. Of the thirty-three studies, twenty-four reported no significant differences in mathematics achievement gains between students of individualized and group settings, five reported students of individualized classes as having superior achievement, and four reported studies of group-based settings as being superior in achievement. Eight comparisons were made at the eighth grade level, six studies proved not to be significant, one was significant for students of conventional large-group instruction, and one was significant in an individualized laboratory approach.

Hirisch concluded that (1) longitudinal studies on the effect of individualized instruction in mathematics learning should be undertaken, (2) future research should consider the manner in which aptitude variables might be differentially related to learner performance under individualized or group-instruction, (3) the role of the teacher when instruction is individualized needs to be studied, and (4) none of the studies reviewed observed the effect of individualized instruction upon the individual learner. Investigations using interviews and observations to determine pupils' mathematics behavior are needed so that they may be analyzed in terms of cognitive structures.

Johnson, Johnson, and Scott (1978) investigated the effect of individualized study and cooperative small-group study on mathematics achievement. The Ss --30 high achieving fifth and sixth graders--had been selected for the study on the basis of their achievement on a teacher-constructed test. Initially, fourteen Ss (three male and 11 female) had been randomly assigned to the individualized class and sixteen Ss (nine males and seven females) were assigned to the four-member small group condition. All students had previous learning experience in individualized settings and small-group settings based on Glasser's meetings theory.

During a fifty-day period, the Ss participated in either the individualized or small-group conditions for one hour per day. Ss in the small groups were instructed to work together as a group in completing an assigned work pamphlet and to draw upon the group for help and clarification of problems rather than from the teacher. Ss in the individualized setting were instructed to work by themselves and seek help and clarification from the teacher, avoiding interaction with other students. Teacher-conducted posttests and interviews were used to measure achievement, i.e., the number of errors the Ss made each day on assignments. The Ss were administered the Minnesota School Affective Assessment Scale (Johnson, R., 1978).

Findings revealed that the small-group Ss scored higher on the sociometric questionnaire than did the individualized Ss, ($p < .05$). On the posttest achievement measure, when the Ss took the test in the

individualized and group setting, individualized students did best ($F = 3.79$, $p < .05$). However, on a later retention test the small-group Ss taking the test in the small-group setting were superior to the individualized Ss taking the test in the small-group setting ($F = 49.68$, $p < .001$). The individualized Ss were superior on retention when they were tested in the individualized setting ($F = 4.92$, $p < .05$).

Slavin (1978) did not find significant differences between students' achievement when taught by a small-group team approach or individually. However, significant differences were found in the amount of time students of each settings were on-task.

The Ss for the study were 205 seventh graders in eight English classes of a rural school district. For a 10-week period, all students in the eight classes studied the same curriculum, a unit on language mechanics which covered grammar, punctuation and usage. The daily schedule for each class consisted of a teacher-lecture for 40 minutes, students work on assignment sheets for 40 minutes, and a daily 20 minute quiz. The experimental condition occurred during the 40 minutes that students were working on assignment sheets. The dependent variables were student time on-task and achievement gains.

In each class the Ss were equally divided into either an individualized group or a four-five member team group. Students in the team groups were encouraged to work together during worksheet periods and help each other learn the material. The Ss of the individualized setting worked by themselves at all times.

Observers were trained by the researcher to a rater agreement of 90 percent for the on-task dependent variable. The observers recorded the behavior by watching each student in sequence for 5 seconds, sweeping the class several times in an observation period. The achievement measure was gathered through teacher quizzes and students' results on the Hoyun-Sanders Junior High School English Test.

Results indicated that there were no significant differences ($p < .05$) between the groups on the achievement variables. However, the small-group teams were on-task significantly more than the individualized students ($p < .001$ team on-task=.93 percent, individualized on-task=.73 percent).

Swanson (1979) assessed differences in English achievement of students who worked on progammed instructional materials in small groups with individualized students who worked by themselves with the materials. The Ss were 304 ninth graders who were divided into two groups of six classes each taught by two teachers. One group worked on programmed material with a peer (2 member group), and the other group worked on instruction by themselves. The Kuder-Richardson Formula 20 was used to determine the reliability of the Follett Individualized English Test, Set J., and a teacher constructed mastery test. It was concluded that the method of instruction did not affect student achievement (univariate analysis, $p < .05$).

The preceding studies looked at individualized instruction as compared with small-group approaches. Others have focused their

attention on differences between students of traditional large-group settings and individualized instruction.

Corbin (1974) studied cognitive growth and student attitude between students of traditional and individualized instructional approaches. In each of four seventh and eighth grade math classes, 54 seventh graders Ss were assigned to an individualized treatment, 57 seventh graders Ss were assigned to the traditional classes, 50 eighth graders Ss were assigned to the individualized settings, and 43 eighth grade students were assigned to the traditional settings.

Cognitive achievement on pretest and posttest measures were derived for the Ss score on the Iowa Tests of Basic Skills - Arithmetic Concepts and Arithmetic Problem Solving. Affective outcomes were measured using the Brayfield and Rother's Index of Job satisfaction. Findings indicated that for all grades, instructional modes, and dependent measures, there were no significant differences in outcomes ($p < .05$). The author concluded that students in individualized settings can learn as much mathematics as students in traditional classroom settings.

Trotta (1975) administered a battery of achievement tests and personality inventories to assess the effect of open versus traditional educational programs on elementary students. Ss (N=138) of intermediate grade levels in open classrooms and a comparable sample (N=160) from traditional classrooms were administered the Locus of Control Scale for Children, the IQ Achievement Responsibility Questionnaire, the Ideal Teacher Checklist, the Lorge-Throndike IQ Test, and the Iowa Test of Basic Skills. Data were assessed by Analysis of Covariance.

Findings suggested that students in the open classroom setting scored significantly higher in mathematics achievement than the traditional group ($p < .05$). However, Ss in the traditional group displayed more internal control and responsibility for achievement ($p < .05$). It was concluded that children do not need a strong sense of internal control, responsibility, or autonomy in order to achieve in mathematics.

Schoen (1974) attempted to combine large-group lecture methods with individualized instruction in a college freshman mathematics class. Seventy-five students were divided into two groups, an experimental group of 37 Ss and a control group of 33 Ss.

The control group attended a two hour lecture taught by a professor and engaged in a one hour discussion session guided by the graduate teaching assistants. The Ss of the experimental condition attended the two hour lecture, but were given individualized instructional modules to master in place of attending the discussion session. The individual modules provided the Ss with written behavioral objectives, multi-media learning activities to achieve objectives, pretests and posttests on the objectives, and a guide sheet for each module to be studied. The final achievement measures for both groups consisted of performance on three tests related to the lecture (80 percent), and performance on discussion quizzes or module tests (20 percent). No significant differences were found between the two groups in mathematics achievement ($p < .05$). Schoen concluded that the two methods can be

combined into mathematics programs. Individualized modules allowed the student greater interaction with learning and provided additional time for the teaching assistants to work longer with other students.

Other researchers have compared small-group instructional settings with traditional large-group approaches. Peterson and Janicki (1979) investigated student interactions and learning in two large-group approaches (25-26 students) and two small group approaches (24-25 students). Two elementary teachers taught the fourth, fifth, and sixth grade Ss a two week fractions unit. The students in the small-group approach were arranged into four-member heterogeneous ability groups for the purpose of working together on workbook assignments. Students in the large-group approach worked on workbook problems individually. Both groups received daily instruction from teachers in whole class settings before being assigned workbook problems.

An observation system was constructed by the researchers to assess the fidelity of implementation of the two teaching approaches and to measure student behavior during the class. The observation system required the coder to observe four target students and the teacher during each 20 second interval of classroom intervention. The coder observed one four-student group for 10 minutes and then moved on to observe another four students for 10 minutes. The overall generalizability coefficient for rater categories was p=.84.

A 35 item fractions test was administered to the Ss at the end of the study. Two weeks later the students were given the same

achievement test to assess retention. Students of both approaches did equally well on the achievement test at the end of the unit. However, on the delayed retention test, high-ability student did better in the small group approach and low-ability students did better on the delayed test in the large-group approach. It was suggested that students' achievement could be improved by adapting instruction to the needs of the individual student.

Sharan, Ackerman, and Hert (1980) conducted a three week experiment to evaluate the academic achievement of second through sixth grade pupils in five classrooms (N=108) taught in cooperative small groups versus pupils in five classes (N=109) where traditional whole group settings were used. Special achievement tests were constructed by the researchers to test low and high levels of cognitive functioning according to Bloom's taxonomy. It was hypothesized that there would be no significant differences between the small-group Ss and large-group Ss on the lower level cognitive objectives, but small group Ss would excel on high-level objectives. Student and teacher interactions were measured using an observation guide developed by the researchers. Achievement measures were collected from instruments developed by teachers and the researchers.

Each grade level and instructional group was taught a social science unit selected by the teachers. In the large-group setting, the teachers lectured and permitted question and answer activities. In the four-five-member small groups, Ss worked separately, with teachers providing guidance when needed.

According to the observation data, it was found that in the small-group setting that Ss spent most of the instructional time working individually (72 percent). The results of ANOVA indicated that in three out of five cases the small-group Ss achieved significantly higher on high cognitive questions than the Ss of the traditional classes ($p < .01$). However, on the low cognitive level questions, in only one class was there a significant difference between the small and large group settings ($p < .01$).

In summary, research does not provide a definitive guide to the teacher seeking optional methods to be used in structuring classroom time and instructional groups to meet the learning characteristics of individual students. In most cases, the approaches reviewed appear to be equally effective in enhancing student learning (Hirisch, 1976; Johnson, et al., 1978; Swanson, 1979). However, there is evidence to suggest the utility of teachers combining different instructional approaches to meet the learning characteristics of individual students (Corbin, 1974; Klausmeier, 1980; Peterson & Janicki, 1979). Further research is needed to describe the patterns and sequences of teacher and student classroom behavior which are related to time variables (allocated time and time on-task) and different instructional modes.

CHAPTER III

METHODOLOGY

The present study involved a naturalistic observation of students' learning in mathematics. The purpose of the study was to examine classroom time utilization by individual eighth grade students of three selected mathematics classes. The time variables of particular interest to the researcher were the amount of classroom time the students spent on-task, off-task, and in sanctioned non-instructional activities (Appendix B). The researcher made no attempt to manipulate time or instructional variables within the observed classrooms. The students' level of mathematics achievement was derived from the results of a locally-constructed mathematics test.

Description of Sample

The following section describes the school and the subjects of this study.

School

The school selected for this study was an integrated urban school located in a large industrial city in the Midwest. In 1973 the school changed from a junior high school to a middle school with grades 6, 7, and 8. The racial composition of the student enrollment (approximately 900 students) in 1979-80 was 46 percent black, 46 percent white, with the remaining 8 percent representing Hispanic, Native American and Oriental groups. The socioeconomic level of many students qualified them for ESEA Title I programs and services.

The students were organized into eight units for instruction. In 1979-80, the breakdown of the units by grades were: grades 6-7 combined, (1 unit); grade 7, (3 units); grades 8, (3 units); and grades 7-8 combined, (1 unit). It was school policy that the students in each grade and each unit would be heterogeneously grouped by sex, race, and scholastic ability.

Subjects

The total population of eighth graders in 1979-80 was approximately 400 students. Subjects (N=60) were drawn from three mathematics classes which had a total eighth grade enrollment of 28, 26, and 20 students respectively. The latter class was a 7-8 unit with a total enrollment of 28 students. The three classes were chosen by the researcher on the basis of interviews conducted with the school's mathematics staff. Each of the teachers assured the researcher that their class was heterogeneously grouped by sex, race, and scholastic ability. Each of the teachers followed one distinct instructional mode: individualized, small-group, or large-group instruction. The teachers were not asked to adapt other instructional approaches during the study. It is noted that this approach to instruction is not in accord with the concept of individual educational programming as described by Klausmeier (1980).

During the first week of the study, the researcher observed all the eighth grade students present in each class each day. It had been predetermined by the researcher that students missing more than four days of class out of the first five days of observation would be excluded from the study. There were 26 students involved with Class A: large-group mode (19 chosen, 7 excluded), 20 with Class B: small-group mode (20 chosen,

0 excluded), 28 with Class C: individualized (21 chosen, 7 excluded). Class B: small-group mode was a grade 7-8 unit of 28 students.

The researcher did find that the total number of students in each class was representative of the school's population by race. However, there was a higher number of eighth grade female than eighth grade male students in each class observed. The total number of eighth graders in each class by sex was for Class A: large-group mode (16 female - 12 male), Class B: small-group (13 female - 7 male), and Class C: individualized (15 female - 11 male). Table 1 shows the sex and race of the subjects chosen in each teacher's class. Selection and exclusion of students for the study had no bearing on reducing the original class size, disturbing normal student activities, or of influencing the teachers' instructional approach.

During the observational phase of the study, individual students' achievement levels in mathematics were not known by the researcher. Three weeks after the final observations were completed, the school provided the researcher with the subjects' scores on a recently administered locally constructed mathematics test. The test items were designed to measure the students' mastery of eighth grade mathematics. The mathematics department of the school developed the test.

Scores on the 100-item mathematics test were used to divide subjects into three levels of achievement--high, middle, and low. Cut-off points in the distribution of subjects on the local mathematics test were:

1. Students with raw scores of 63 and below were assigned to the low-group (N=20).

TABLE 1
NUMBER, SEX, AND RACE OF SUBJECT IN
THE THREE TEACHERS' CLASSES

	Class A: Large-Group		Class B: Small-Group		Class C: Individualized	
Sex	male	female	male	female	male	female
Race						
black	4	5	2	5	3	8
white	2	6	5	7	6	4
other	1	1	--	1	--	--
Total	7	12	7	13	9	12
	19		20		21	

2. Students with raw scores in the 76-44 range were assigned to the middle-group (N=19).

3. Students with raw scores of 77 and above were assigned to the high-group (N=21).

This study did not attempt to assess student achievement during the observation periods. Student test scores were used solely to put students in one of the three achievement levels for later statistical analyses. Table 2 shows the number of eighth grade subjects in each of the three achievement levels and each teacher's class. Disproportions of subjects in each of the three achievement levels across the three teachers' classes were due to student class attendance and higher test performance (particularly by the subjects in Class B: small-group mode).

Description of Each Teacher's Class

The following section provides general information and a discussion of classroom processes as related to three different mathematics classes. For indentification purposes each class is presented under one of three descriptive headings: Class A: Large-group mode, Class B: small-group mode, and Class C: individualized mode.

Class A: Large-Group Mode

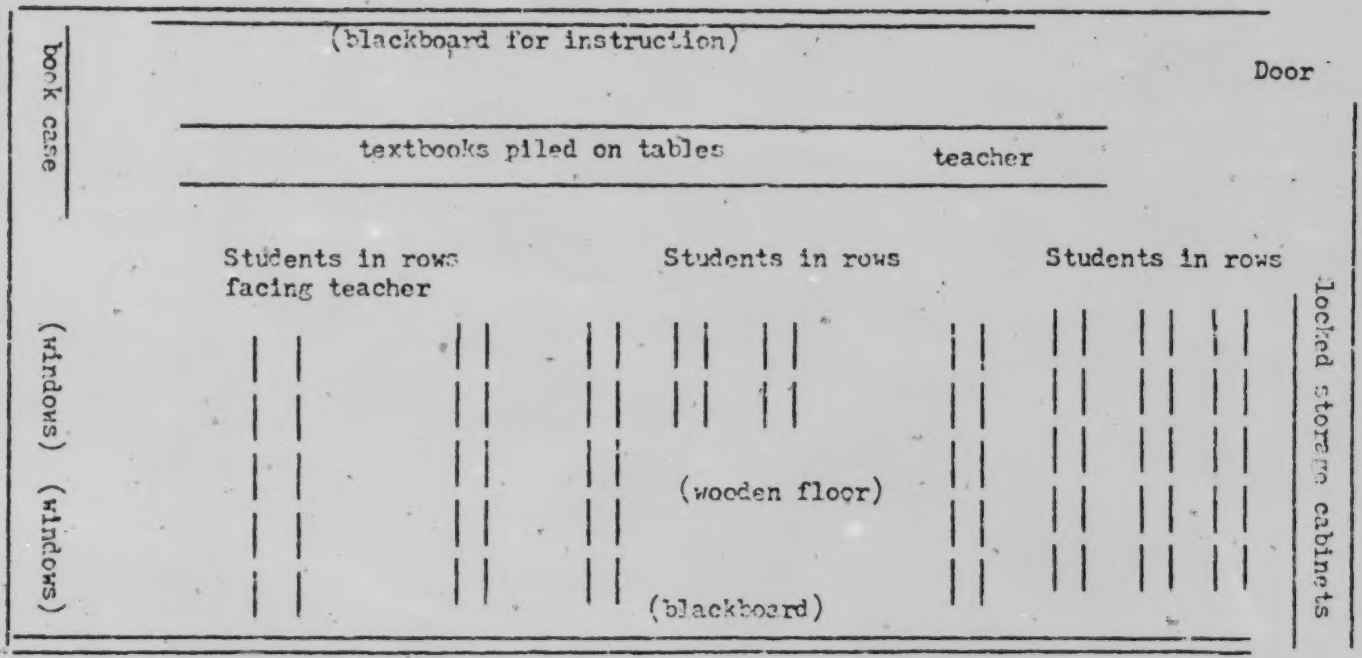
The teacher of this mode was 43 years old, male, and had 17 years of teaching experience. The teacher had taught all 17 years at the school. The teacher began instruction each day by lecturing to the students and presenting solutions to problems on the blackboard. After explaining the daily problems to the students, the teacher assigned specific

TABLE 2
NUMBER OF SUBJECTS IN EACH OF THREE
ACHIEVEMENT LEVELS AND EACH TEACHER'S CLASS

Group	Class: C INDIVIDUAL	Class B: SMALL	Class A: LARGE	Total
High (77 and above)	4	10	7	21
Middle (76-64)	8	5	6	19
Low (63 and below)	7	5	8	20

tasks from the textbook for all the students to complete. The students worked on the problems at their seat. Students did not interact with others in solving the problems. The teacher circulated around the room and checked on students progress. When all students had finished the task, the teacher engaged in question and answer activities where students gave their answers to the problems solved. If numerous student errors were noticed, the teacher solved the specific problems on the blackboard. Next, the teacher explained the following set of problems, giving examples and solutions, and assigning more problems from the textbook for all the students to solve. The cycle of teacher-presentation, students working on the problems, question-answer activities, and new teacher presentations was repeated numerous times throughout the class period. The teacher would reserve the last 10 minutes of each class for assigning 10-20 mathematics problems to the students. The students worked individually in their seats on solving the problems.

All students in the class received the same assignments and were expected to master the objectives presented in the lecture and work sessions. The major instructional tool used was the textbook (Heath Mathematics, Rucker & Dilley, 1979; seventh and eighth grade edition). Instructional manipulatives of a yard stick, cubed wooden block, and string were used by the teacher on one occasion. Students did not use manipulatives. Homework was not assigned, but the students were expected to have any problems that were unsolved by the end of class done before the next class day. Figure 6 shows the classroom layout.



Figue 6. Sketch of Class A: Large-group Mode

Class B: Small-Group Mode

The teacher of this class was 40 years old, female, and had 15 years of teaching experience. The teacher had taught all 15 years at the school. A teacher's aid was present in the class on three occasions. The aid did not assist the teacher with student instruction. Students did not go out of the class to receive instruction. All materials used for instruction were present in the classroom. The teacher sat at her desk in the front of the room and corrected student work, assigned new units, and answered questions. If a group of students had been pretested on the same unit, a student would be assigned by the teacher to correct the tests. The teacher encouraged students to interact and to attempt to solve problems by themselves. However, many individual students spent a considerable portion of time gathered around the teacher's desk waiting for help.

All students in the class were expected to meet minimal competency levels in mathematics. However, not all eighth graders in this seven-eight unit progressed through course objectives in the same manner. The teacher had identified a group of 10 students that were assigned common objectives to master. Students of this small group worked toward full mastery of the assigned tasks and were expected to complete the tasks at the same time. Ss encouraged members to complete assignments on time. The students interacted freely and without reservation. The group was encouraged to work together and solve problems before going to the teacher for additional help. The teacher interacted with the group once

each day in teacher-led small-group instruction. In these sessions, the teacher lectured to the group concerning the next unit, and then presented problems for the students to either work on at their desks or at the blackboard. The teacher monitored student progress and provided further explanations when needed. Students of this group did not work with other students in the class.

The remaining eighth grade students spent the class period learning individually or in small groups of two or three. These students also had common objectives to master, but of a different level than the 10-member small group. In the two or three member small groups, students were encouraged to work at their own pace; however, all were expected to master the same units. A deadline was imposed by which time the students were to complete assigned units. Although students of this grouping were permitted to interact and sit near with whomever they wanted, most spent a substantial amount of classroom time waiting for teacher assistance. The teacher did not involve these students in teacher-led activities.

Materials used for instruction in the class were located in cardboard boxes and on bookshelves to the rear of the room. The teacher relied upon the Heath and Holt textbooks and teacher-made flow charts for instructional purposes. No other instructional manipulatives were observed being used. The teacher had one class set of each textbook. Students were encouraged to finish daily work assignments within the class period, and homework was not assigned. Figure 7. represents the classroom layout.

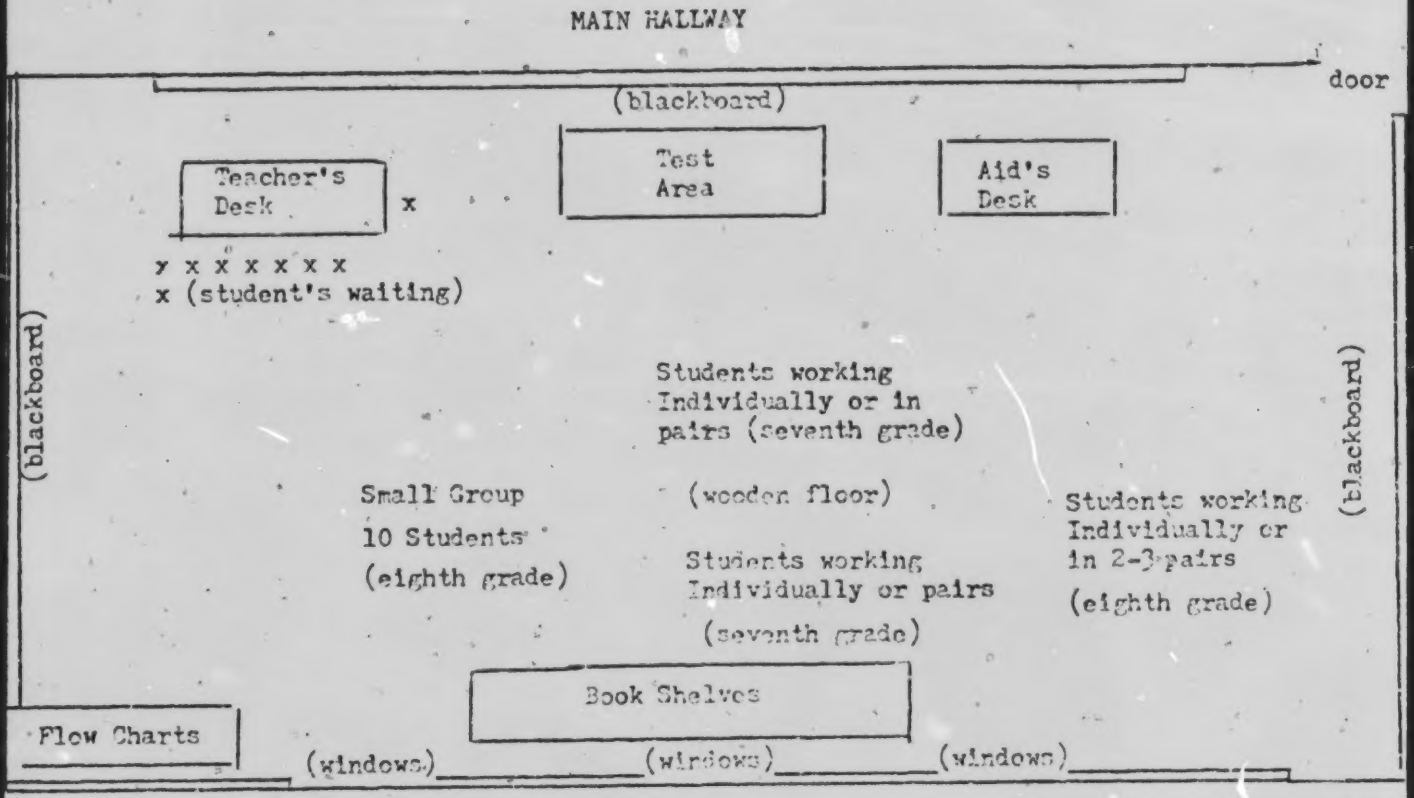


Figure 7. Sketch of Class B: Small-group Mode

Class C: Individualized Mode

The teacher of this class was a 28 year old male with 4 years of teaching experience. The teacher had taught all 4 years in the school. During the last two years the teacher had been developing an individualized mathematics program. Schoolwide policy established that students would meet minimal competency requirements in mathematics. Goals were outlined by the mathematics department. Teachers were free, however, to meet these goals in their own manner. In this class, course objectives were broken down into 21 units of objectives. Each unit conisted of 4-5 sub-units with instructional objectives. Objectives all students were required to master for meeting minimal competency requirements were in the first units. Pretests were given to assess an individual student's mastery of units. Each student was allowed to progress through the units at his or her own rate. Units for the course proceeded in linear fashion from minimal competency levels to more advanced objectives. Each student, however, had to master the same common objectives, and objectives in a unit had to be mastered to criterion level before moving on to the next higher unit. Students were allowed to vary the order of sub-units mastered.

Students were not allowed to leave the classroom without the teacher's permission. Passes were required for students to leave the class during class periods. In this class, students were seated in straight rows facing the teacher and the door. Materials used for instruction were located in cardboard boxes and on bookshelves to the far right and rear of the classroom. The students were allowed without teacher permission to leave their seats and retrive instructional materials around the room.

Blackboards were hung on the far left and front walls. The teacher placed mathematics games on the boards for the students to work on. Students did not use the boards to solve their own problems. The students were encouraged to work separtely at their seats on assignments. Students were allowed, however, to assist each other on problems. This activity was limited by the students' proximity to others; that is, a student talking to his or her immediate neighbor. The teacher sat in the front of the room at his desk and corrected assignments, answered questions, or assigned new units. He would occasionally use the blackboard to present a problem to an individual student. The teacher encouraged students not to group around his desk and wait for help. During the class period, however, one or more students would be continuously seeking the teacher's assistance. In four instances the teacher assigned a student tutor to help a peer on the instructional manipulative used in the class, a large calculator or adding machine. Figure 8 represents the classroom layout.

The teacher stated that the greatest problem in initiating and maintaining an individual educational program was finding appropriate instructional materials of interest to the students. The instructional material used in the course consisted largely of typed mimeographed lists of learning tasks for each sub-unit. From the sub-unit guides the students were assigned textbook pages to read, problems to solve, definitions to remember, or "flow charts" to complete. "Flow charts" were one-page teacher-made activities (connect the dot, figure ground problems, etc.) and reproductions of activities from the Mathimagination Series (4,5,6) (Marcy, S. & Marcy, J., 1973).

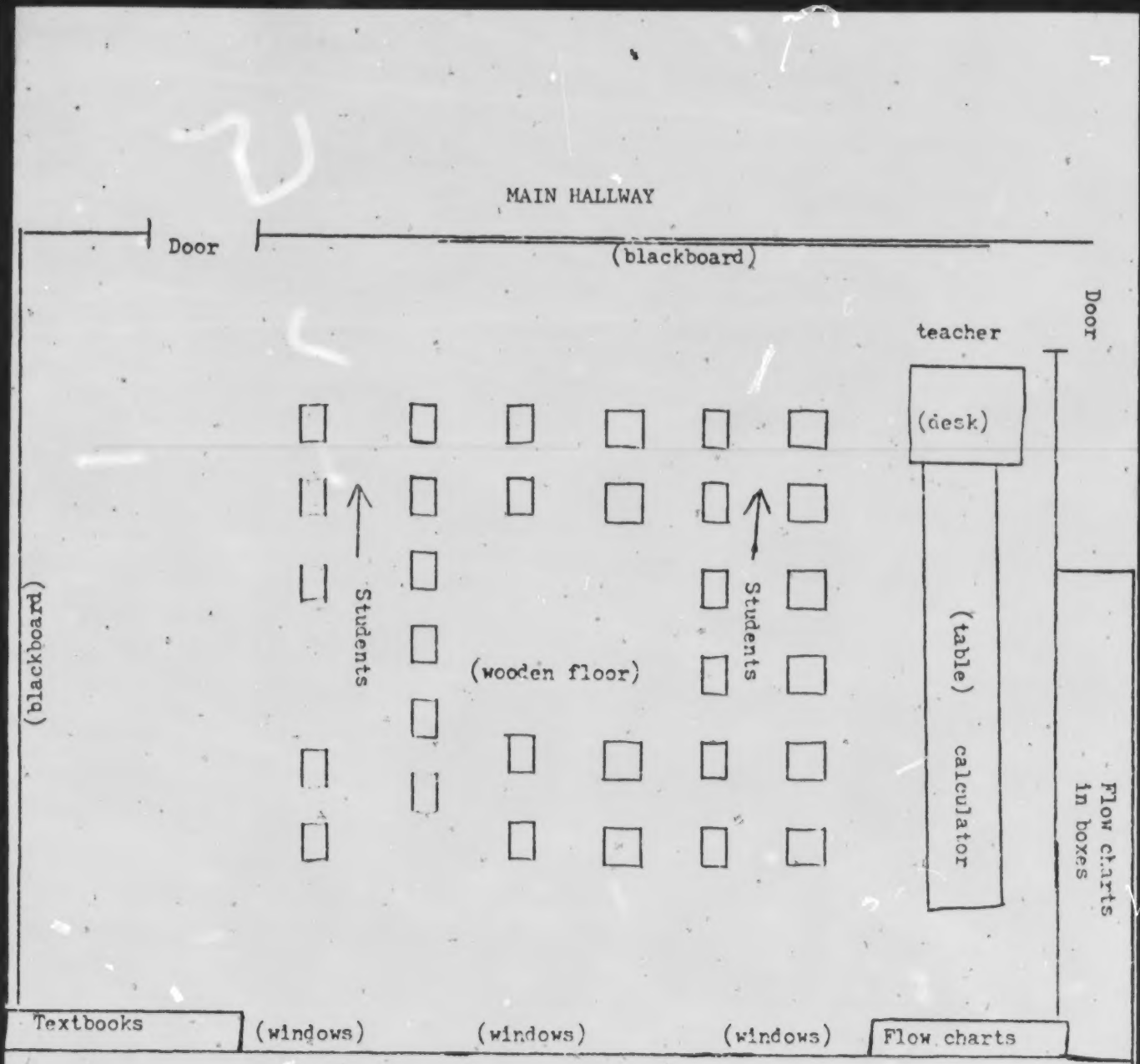


Figure 8. Sketch of Class C: Individualized Mode

The school's district mathematics committee was responsible for choosing the major mathematics textbook used by the city's eighth grade classes. The textbook chosen by the committee was the Heath Mathematics (Rucker & Dilley, 1979). The teacher had been issued a classroom set of the seventh and eighth grade edition of the text. The supplementary textbook, used more than the Heath text was the seventh and eighth grade edition of the Holt School Mathematics (Nicholas, 1974). Students were not allowed to take the books out of the class. The books were counted each day and placed back on the shelves. Homework was not assigned to students. Most mathematics learning by Ss was limited to the regular scheduled period.

Data Gathering Instruments and Dependent Variables

An observation instrument was used to record student behaviors and other classroom processes. The observation system used for this study was a modified version of models developed by Webb (1979) and Becker, Englemann, and Thomas (1975). An Observer's Manual (Appendix B) was constructed as a reference device for providing judgments as to the students' behaviors that were under investigation. Once the behavior had been identified, it was coded and recorded on the Form for Recording Student Time On-Task, a paper and pencil "time-sampling" instrument. The student behaviors and time variables which served as dependent variables for this study were the amount of time students spent "on-task", "off-task", and "sanctioned non-instructional". These variables were a function of three complex time descriptors, "total allocated time", "total instructional time", and "total adjusted instructional time".

Explanation of these terms are presented in the Observer's manual and below:

Total Allocated Time--was the amount of time teachers made available each day for mathematics instruction. Allocated time was reflective of the interval from when the bell had rung to begin and end the class period.

Total Instructional Time--was the amount of time that students spent on-task, off-task, and in sanctioned non-instructional activities.

Total Adjusted Instructional Time--was the amount of instructional time per day that students spent on-task and off-task. The category was adjusted to exclude the amount of time that students spent in sanctioned non-instructional activities.

Time On-Task--was the amount of adjusted instructional time that students spent actively working on assigned tasks. The category included the engaged students' behaviors of writing, thinking, listening, or speaking.

Time Off-Task--was the amount of adjusted instructional time that students were inappropriately disengaged for mathematics learning. The category included disengaged students' behaviors of socializing, daydreaming, misbehaving, or aimlessly walking around the classroom.

Sanctioned Non-Instructional Time--was the amount of instructional time that students were neither on task or off task. In this category, students were involved in interim activities, waiting, or non-mathematics related activities that the teacher had approved.

The instrument used to assess Ss achievement was a 100-item locally-constructed mathematics test. The test was administered in June, 1980. Raw scores from the test were used to identify students of high, middle, low achievement in mathematics. As previously

mentioned, the number of subjects at each achievement level, teaching approach, and the range of raw scores are presented in Table 2.

Procedure

Prior to beginning the study, the researcher met with the mathematics teachers to discuss curriculum units, instructional materials, and teaching approaches, and student profiles, such as school attendance. At this meeting, the researcher informed the teachers of the observation procedures to be used. Teachers explained the student variables that they believed to be indicative of "on-task", "off-task", and "non-instructional" activities.

The researcher met with the teachers again one week before the study began to review information provided at the first meeting. Time was spent discussing the instructional approaches that would be used, the materials for each unit, and the students' behavioral performance expected. The teachers were not asked to modify their approaches or student materials for the study. Dates and schedules for the observation phases were agreed upon and the researcher was provided with a student seating chart and a listing of students in each class. A total of eleven observations were made on each class between March 19, 1980, and May 2, 1980.

During the first day of observations, the entire population of listed students present in the class was studied. The observer randomly selected

"target groups" of four students each to observe at fixed intervals of five minutes. This technique is termed "time-sampling". The five minute observation set was broken into 20 second intervals, observe the target group for 15 seconds and use the next 5 seconds to code and record student behaviors. At the end of the 5 minute interval, the observer would move on to another target group and begin the same procedure. The researcher had decided prior to the study that students not present in the classes for four out of the first 5 day set of observations would be excluded from the study. The observer began coding with a different target group of students each day. In addition the groups were not fixed, therefore, each student was observed at various times during the class period. During the 11-day study, the Ss were observed an average of 7.2 minutes per day in each of the three classes.

Data Analysis

The investigation employed two one-way analyses of Variance (ANOVA). The ANOVA examined the effects of the three achievement levels on the dependent variables, time on-task and sanctioned non-instructional time. A nested design (simple effects) was used to analyze means for significance. Twelve Dunn-Bonferroni multiple comparisons were planned for each dependent variable (Dunn, 1961; Miller, 1966). Arcsin transformations were used to stabilize percentage variances (Kirk, 1968).

During preliminary data analysis, a significance test for homogeneity of variances on the "on-task" ANOVA and the "sanctioned-noninstructional" ANOVA was performed. The result of the test (on-task: Bartlett-Box F=2.048, p=.039; sanctioned non-instructional: Bartlett-Box F=.892, p=.522) indicated that the assumption of homogeneity of variances for Analysis of Variance was violated for the on-task data. It was decided for the purpose of multiple comparisons that separate variances estimates would be adopted for analyzing each contrast. Welch Aspin t-tests were performed to adjust the degree of freedom for each estimate (Aspin, 1949; Welch, 1947).

Pilot Test and Rather Reliability Measures

The observation procedure and Observation Manual's instructions were pilot tested to evaluate their clarity and appropriateness for use with secondary students. The study was also undertaken to establish estimates of interrater reliability measures. The subjects for the pilot test were 54 seventh and eighth grade students in a Madison, Wisconsin middle school. The school has been selected for the test on the basis of its familiarity with and application of the Wisconsin Program for the Renewal and Improvement of Secondary Education's seven-step model of instructional programming for the individual student (IPM). The researcher and a trained rater observed three classes each for one day. The students had been participating in reading, science, and mathematics classes. Observed data were computer-scored and analyzed

with the SPSS: Statistical Package for Social Sciences (Nie, Hull, Jenkins, Steinbrenner, & Brent, 1975). Cronbach's Alpha coefficient for interrater reliability on the dependent variables were: (on-task, Alpha = .95); (off-task, Alpha = .91); and (sanctioned non-instructional, Alpha = .94).

During the final week of the observational phases of the study at the research school, rater reliability measures were established. The researcher and the trained observer used in the Pilot Test observed Ss from each of the three mathematics classes for one day. A total of 54 Ss was observed. Cronbach's Alpha reliability coefficient for interrater agreement were: (on-task, Alpha = .92); (off-task, Alpha = .97): and (sanctioned non-instructional, Alpha = .97).

CHAPTER IV

RESULTS

Three scores were calculated for each student on the dependent measure: total time on-task, total time off-task and total sanctioned non-instructional time. For descriptive purposes the variables were first presented in percentages. Later, the on-task and sanctioned non-instructional percentages were converted to arcsin transformations for statistical analyses. Time off-task was not directly analyzed in the study. However, in that time on-task and off-task were summed to represent one unit of measure (adjusted instructional time); analysis of either variable would have yielded equivalent results.

One-way analysis of variance was performed separately on the on-task and sanctioned non-instructional data to generate mean scores and to test each sample variance for homogeneity. Appropriate Dunn-Bonferroni planned comparisons were calculated to test mean scores for significance. All analyses were carried out using the SPSS: Statistical Package for the Social Sciences (NIE, et al., 1975).

Three pairwise comparisons were planned to test each of the research hypotheses. The contrasts of interest were identical for both the on-task and sanctioned non-instructional dependent variables.

Kirk (1968) noted that the Dunn-Bonferroni multiple comparison procedure consists of splitting up the level of significance among the set of planned comparisons. The procedure is further appropriate if the researcher is concerned with the consequences of making a type I error.

The nested design (simple effects) used in this study called for the experimental error rate to be set at .15. In this regard, the hypotheses (1 and 5) concerned with the effect of the three achievement levels of students on the dependent variables are given an overall alpha of .05. The remaining 10 percent of the error rate is divided equally among the nested comparisons. That is, the remaining hypotheses for each of the dependent variables shared a nested error rate of .10. The level of significance used to test the nested hypotheses was alpha = .011 (.10 ÷ 9 (number of nested comparisons)).

Before examining the results of the ANOVA and planned comparisons on each of the dependent variables it may be necessary to become familiar with the general time variables and other learning activities on which the dependent measures were based. The descriptive data as reported in the next section were gathered by the researcher and recorded on the observation instrument discussed in Chapter III. It is possible to refer to Appendix B for clarification of the process variables described.

Descriptive Statistics on Time Variables and Student Activities

Table 3 presents the mean number of minutes classes spent per day in each teacher and student category. The means in Table 3 indicate that the teachers did not vary greatly in the amount of allocated time (range of 47-45 minutes). Teachers in Class A: large-group mode and Class C: individualized mode maintained a set schedule throughout the

TABLE 3

MEAN NUMBER OF MINUTES SPENT PER DAY

IN ALLOCATED TIME, INSTRUCTIONAL TIME, AND ADJUSTED

INSTRUCTION TIME IN EACH TEACHER'S CLASS

Time Variables/ Minutes Per Day	Teachers		
	Class A; Large Group	Class B: Small-Group	Class C: Individual
Allocated Time	47.00	46.82	45.00
Instructional Time	42.64	37.91	38.55
Adjusted Instructional Time	38.82	29.55	33.55

study. The teacher of Class B: small-group mode was a member of an instructional unit which permitted time schedules to be arranged to accomodate the needs of other teachers in the unit. Allocated time periods for this class ranged from 22 to 52 minutes.

The teachers' approaches did vary in instructional time and adjusted instructional time. There was a five minute difference per day in instructional time between the large-group and small-group class. The large-group teacher was most effective in settling students into the daily learning tasks. In the small-group and individual group, however, the Ss were expected to initiate learning activities on their own. In both of these classes it took five to seven minutes before all students entered the classroom and settled into the learning task.

The means for adjusted instructional time (on-task and off-task, combined) indicate that Ss in the small-group class spent over 8 minutes per day of instructional time in teacher-sanctioned activities; the individual class Ss spent slightly less (5 minutes) per day in sanctioned-time. Over nine minutes per day separated the large-group Ss and the small-group Ss in adjusted instructional time.

The average percent of daily attendance of Ss of each achievement level and each class is depicted in Table 4. The large-group class had the lowest attendance record of the three approaches. It could be hypothesized on the basis of this finding that the structured approach of this class resulted in students' avoidance of the class. More research is needed to validate this finding.

TABLE 4

MEAN PERCENT OF DAILY ATTENDANCE IN

EACH ACHIEVEMENT LEVEL AND EACH CLASS

Class	Achievement Level			Total
	High	Middle	Low	
A: Large	79	83	84	82
B: Small	95	97	88	94
C: Individualized	89	87	82	86

Table 5 shows the amount of minutes Ss of each achievement level and class were on-task each day. The Ss of Class A: large-group tended to spend more minutes each day on-task than the other two approaches. It is interesting that under two minutes separated Class B: small-group Ss and Class C: individualized Ss in time on-task. Also, the low achievers in the individualized class spent approximately 60 percent of the total instructional time per day on-task in comparison to the high achievers in the large group class who spent over 85 percent of the instructional on-task.

Table 6 and Table 7 show the percentages of time on-task and sanctioned non-instructional activities spent by Ss in each achievement level and each teacher's class. Means and standard deviations are presented in arcsin transformations. Students in Class C: individualized mode at the high and low achievement levels showed the widest range in time on-task percentages for a class (96-70 percent). The Ss of Class B: small-group mode led all approaches in time on-task and sanctioned non-instructional time.

In examining Table 4, it appears that the Ss of Class B: small-group mode were active learners for short periods of time, but spent considerable portion of class time in sanctioned non-instructional activities. Again, the teacher of Class A: large-group was effective in controlling teacher sanctioned non-instructional activities and maintaining student time on-task for a longer period of instructional time than the other teachers' classes. Overall the classes averaged 89 percent of adjusted instructional time on-task and 14 percent of instructional time in sanctioned non-instructional activities.

Table 8 presents the percent of instructional time that Ss in each

TABLE 5

DAILY ADJUSTED AVERAGE MINUTES ON-TASK

FOR Ss IN EACH LEVEL AND EACH CLASS

Class	Level of Achievement			
	High	Middle	Low	Total
Class A: Large-group	36.49	35.71	31.83	34.94
Class B: Small-group	27.48	26.00	26.59	26.89
Class C: Individualized	32.20	29.86	23.48	28.55

TABLE 6

PERCENTAGES, MEANS, STANDARD DEVIATIONS, AND ARCSIN TRANSFORMATIONS OF TIME ON-TASK IN EACH ACHIEVEMENT LEVEL AND TEACHER'S CLASS

Class	Level of Achievement High	Midle	Low	Total
Class A: Large-Group				
Percent	.94	.92	.82	.90
Mean	2.6586	2.5738	2.2796	2.4899
S.D.	.2028	.1938	.1479	.1553
Subjects	7	6	8	21
Class B: Small-Group				
Percent	.93	.88	.90	.91
Mean	2.6148	2.4482	2.4942	2.543
S.D.	.2295	.2643	.5050	.3223
Subjects	10	5	5	20
Class C: Individualized				
Percent	.96	.89	.70	.85
Mean	2.7445	2.4679	1.9854	2.3484
S.D.	.1882	.12030	.4691	.3357
Subjects	4	8	7	19
Total				
Percent	.95	.90	.81	.89
Mean	2.654	2.4966	2.2301	2.4628
S.D.	.21436	.21723	.3830	.3404
Subjects	21	19	20	60

TABLE 7

PERCENTAGES, MEANS, STANDARD DEVIATIONS, AND ARCSIN TRANSFORMATIONS OF SANCTIONED NON-INSTRUCTIONAL TIME IN EACH ACHIEVEMENT LEVEL AND EACH TEACHER'S CLASS

Class	Level of Achievement			
	High	Middle	Low	Total
Class A: Large-Group				
Percent	.09	.07	.09	.09
Mean	.6171	.5283	.6202	.5929
S.D.	.2358	.1013	.1339	.1684
Subjects	7	6	8	21
Class B: Small-Group				
Percent	.16	.25	.31	.22
Mean	.8269	1.0439	1.1824	.9700
S.D.	.1535	.2320	.1330	.1711
Subjects	10	5	5	20
Class C: Individualized				
Percent	.12	.14	.11	.13
Mean	.7162	.7501	.6795	.7170
S.D.	.1773	.1952	.2493	.21039
Subjects	4	8	7	19
Total				
Percent	.13	.14	.15	.14
Mean	.7359	.7574	.7815	.7579
S.D.	.1889	.1826	.1830	.2524
Subjects	21	19	20	60

class spent in various grouping patterns. Instructional time is comprised of on-task, off-task, and sanctioned non-instructional time. The teachers and Ss spent a majority of instructional time in the identified teacher's mode. In Class B: small-group, the teacher-led activities were limited primarily to the 10-member Ss group; on only one occasion was the teacher observed interacting with a small group of Ss outside of the 10-member group. Additionally, the large-group activity of Class B: small-group and Class C: individualized modes was spent in a sanctioned non-instructional category ((N) non-mathematics instruction).

The coded activities of students in each achievement level and each class for total adjusted instructional time are presented In Tables 9 (Class A: Large-Group), 10 (Class B: Small-Group), and 11(Class C: Individualized) In all three classes, when instruction was individualized, students most frequently were on-task writing. Student time off-task was greatest in the individualized and small-group setting when Ss were working with peers in student-led activities. Another important finding was that Ss of middle and low achievement in teacher's Class B: small-group spent more time interacting with the teacher on a one-to-one basis than the same level of achievers did in teacher's Class C: individualized mode.

Table 12 (Class A: Large-Group), 13 (Class B: Small-Group) and 14 (Class C: Individualized) show the percent of total instructional time that Ss of each achievement level and each teacher's class spent in sanctioned non-instructional activities. The data have been combined by grouping and activity to make comparisons more appropriate to the major time variable.

TABLE 8

PERCENT OF TOTAL INSTRUCTIONAL TIME AND GROUPING ACTIVITY IN EACH TEACHER'S CLASS

CLASS	Grouping Activity			
	Individualized	Teacher-Led Small Group	Student-Led Small Group	Large Group
Class A: Large-Group	.19	.00	.00	.81
Class B: Small-Group	.47	.24	.28	.01
Class C: Individualized	.91	.00	.08	.01

TABLE 9

PERCENT OF GROUPING ACTIVITY OF EACH

ACHIEVEMENT LEVEL IN ADJUSTED INSTRUCTIONAL TIME,

CLASS A: LARGE-GROUP

Grouping/ Activity	Achievement Level High	Middle	Low	Total
Individual				
On-Task				
(Writing)	.83	.91	.82	.85
(Verbal)	.01	.004	.01	.01
(Covert)	.04	.026	.03	.03
Off-Task	.12	.06	.14	.11
Small-Group				
On-Task	--	--	--	--
Off-Task	--	--	--	--
Large-Group				
On-Task				
(Writing)	.25	.25	.24	.25
(Verbal)	.13	.09	.09	.11
(Covert)	.56	.57	.51	.54
Off-Task	.06	.09	.16	.10

TABLE 10

PERCENT OF GROUPING ACTIVITY OF EACH

ACHIEVEMENT LEVEL IN ADJUSTED INSTRUCTIONAL TIME,

CLASS B: SMALL-GROUP

Grouping/ Activity	Achievement Level High	Middle	Low	Total
Individual				
On-Task				
(Writing)	.64	.80	.65	.80
(Verbal)	.03	.11	.15	.09
(Convert)	.07	.00	.10	.03
Off-Task	.06	.09	.10	.08
Small-Group (Student-Led)				
On-Task				
(Writing)	.56	.67	.73	.60
(Verbal)	.27	.14	.02	.22
(Convert)	.06	.00	.04	.05
Off-Task	.11	.19	.21	.13
Small-Group (Teacher-Led)				
On-Task				
(Writing)	.35	.25*	.28*	.32
(Verbal)	.15	.07	.11	.13
(Convert)	.46	.56	.60	.50
Off-Task	.04	.12	.01	.05
Large-Group				
On-Task	--	--	--	--
Off-Task	--	--	--	--

*Activity Occurred on one occasion

TABLE 11

PERCENT OF GROUPING ACTIVITY OF EACH

ACHIEVEMENT LEVEL IN ADJUSTED INSTRUCTIONAL TIME,

CLASS C: INDIVIDUALIZED

Activity	Achievement Level			
	High	Middle	Low	Total
Individual				
On-Task				
(Writing)	.88	.80	.60	.75
(Verbal)	.05	.05	.06	.05
(Covert)	.04	.06	.05	.05
Off-Task	.03	.09	.29	.15
Small-Group (Student-Led)				
On-Task				
(Writing)	--	.08	.10	.07
(Verbal)	.42	.53	.43	.48
(Convert)	.38	.14	.03	.17
Off-Task	.20	.25	.44	.28
Small-Group (Teacher-Led)				
On-Task	--	--	--	--
Off-Task	--	--	--	--
Large-Group				
On-Task	--	--	--	--
Off-Task	--	--	--	--

TABLE 12

PERCENT OF GROUPING ACTIVITY OF EACH ACHIEVEMENT LEVEL IN SANCTIONED NON-INSTRUCTIONAL TIME, CLASS A: LARGE-GROUP

Grouping/ Activity	Achievement Level High	Middle	Low	Total
Waiting (Individual)	.12	.17	.17	.16
Interim (Individual)	.06	.08	.04	.06
Waiting (Large-Group)	.57	.50	.49	.50
Interim (Large-Group)	.15	.15	.20	.18
Non-Mathematics	.10	.10	.10	.10

TABLE 13

PERCENT OF GROUPING ACTIVITY OF EACH

ACHIEVEMENT LEVEL IN SANCTIONED NON-INSTRUCTIONAL TIME,

CLASS B: SMALL-GROUP

Grouping/ Activity	Achievement Level High	Middle	Low	Total
Waiting (Individual)	.14	.60	.65	.43
Interim (Individual)	.35	.24	.15	.26
Waiting (Student-Led Small-Group)	.10	--	.04	.05
Interim (Student-Led)	.07	--	--	.03
Waiting (Teacher-Led Small-Group)	.15	.03	.05	.09
Interim (Teacher-Led)	.18	.06	.07	.11
Non-Mathematics (Large-Group)	.01	.07	.04	.03

TABLE 14

PERCENT OF GROUPING ACTIVITY OF EACH

ACHIEVEMENT LEVEL IN SANCTIONED NON-INSTRUCTIONAL TIME,

CLASS C: INDIVIDUALIZED

Grouping/ Activity	Achievement Level High	Middle	Low	Total
Waiting (Individual)	42	35	20	.33
Interim (Individual)	51	58	68	.58
Waiting (Small-Group)	--	--	--	--
Interim (Small-Group)	--	--	--	--
Non-Mathematics Activity (Large-Group)	.07	.07	.12	.09

High achieving Ss in Class A: large-group mode spent 57 percent of their sanctioned non-instructional activities in the large class setting waiting for peers to finish assigned group work. However, in comparison to total time spent in the large-class settings and total sanctioned non-instructional activities, less than 5 percent of the high achieving Ss' instructional time was spent in the sanctioned category.

In Class B: small-group (Table 13) a majority of sanctioned non-instructional activity was spent by the students in waiting or walking to the teacher for help. The middle and low achievers in Class B spent an inordinate amount of instructional time in the waiting category. This behavior as coded in Class C: individualized mode frequently represented interim activities, i.e. retrieving materials from the "flow" boxes and shuffling papers.

Results of ANOVA

One-way Analysis of Variance was performed on the student achievement levels for the on-task and sanctioned non-instructional dependent variables. The off-task variable was not statistically analyzed; for all practical purposes the on-task and off-task results would have been equal. Table 15 shows the results of the ANOVA for the on-task variable and Table 16 for the sanctioned non-instructional variable.

The F is not tested when performing planned comparisons. The analysis was undertaken to calculate the mean square error used in contrast comparisons and for testing the sample variances for homogeneity. The

TABLE 15

RESULTS OF ONE WAY ANALYSIS OF VARIANCE ON TIME ON-TASK FOR THE EFFECTS OF ACHIEVEMENT LEVELS

Source of Variation	df	SS	MS	F
Between Groups	8	2.7610	.3451	4.319*
Within Groups	51	4.0754	.0799	
Total	59	6.8364		

*F is not tested in planned comparisons

TABLE 16

RESULTS OF ONE-WAY ANALYSIS OF VARIANCE ON SANCTIONED NON-INSTRUCTIONAL TIME FOR THE EFFECTS OF ACHIEVEMENT LEVELS

Source of Variation	df	SS	MS	F
Between Groups	8	2.0150	.2519	7.372*
Within Groups	51	1.7425	.0342	
Total	59	3.7575		

*F is not tested in planned comparisons

Bartlett-Box Test for Homogeneity of Population-Error Variances (Kirk, 1968; p. 61) was undertaken. The test for the sanctioned non-instructional data was nonsigificant (Bartlett-Box F = .892, p = .522). However, for the on-task data, the assumption of homogeneity of variances was violated (Bartlett-Box F = .2048, p = .038).

It was concluded that separate variance estimates would be used to test the achievement effects and other planned comparisons of both dependent conditions for significance. This method as performed by the SPSS adjusts the degree of freedom for each contrast and reports the appropriate standard error, t-value and t-probability for each comparison.

Results of Planned Comparisons on Means of Time On-Task

Table 17 presents the planned comparisons among the on-task group means. Two significant pairwise differences were found. Students of high and middle mathematics achievement spent significantly greater time on-task than low achievers ($t=4.29$, $p=.00$; $t=2.66$, $p=.016$). No significant difference was found between the means of high achievers and middle achievers means ($p < .0167$).

The hypotheses that Ss of each achievement level (nests) would differ in time on-task between the teachers' classes were not supported. High achievers in each class did not differ significantly in time on-task ($p < .011$). No differences were found between the middle achievers or low achievers when compared separately between teachers' classes ($p < .011$).

TABLE 17

DUNN-BONFERRONI PAIRWISE COMPARISONS,
SEPARATE VARIANCE ESTIMATES,
TIME ON-TASK

Comparison, Groups	df	Difference Between Means	Standard Error	t Value	t Probability (p<)
Achievement Level					
High - Low	17	.42	.09	4.29	.000*
High - Middle	31	.15	.06	2.27	.030
Middle - Low	18	.26	.09	2.66	.016*
Classrooms (High Achievers)					
Cl. A - Cl. B	14	.04	.10	.41	.684
Cl. A - Cl. C	6	-.08	.12	-.70	.502
Cl. B - Cl. C	6	-.12	.11	-1.09	.311
Classrooms (Middle Achievers)					
Cl. A - Cl. B	7	.12	.14	.88	.406
Cl. A - Cl. C	11	.10	.10	.99	.343
Cl. B - Cl. C	7	-.01	.13	-.14	.890
Classrooms (Low Achievers)					
Cl. A - Cl. B	4	-.21	.23	-.92	.407
Cl. A - Cl. C	7	.29	.18	1.59	.155
Cl. B - Cl. C	8	.50	.28	1.77	.114

*significant at p<.0167

Results of Planned Comparison on Means of Sanctioned Non-Instructional Variables

Table 18 depicts the results of planned comparisons on the sanctioned non-instructional group means. Three planned comparisons were undertaken to test if high, middle, and low differed in the amount of time spent in sanctioned non-instructional activities. None of the pairwise comparisons were significant ($p < .0167$); high, middle, and low achievers did not differ.

Three pairwise contrasts were performed at each achievement level to test if the Ss differed in sanctioned activities between the three mathematics classes. Significant differences were found among three out of the nine group means compared (testing at an alpha of .011). Middle achievers in Class A: large-group mode spent significantly less time in sanctioned non-instructional activities than middle achievers of teacher's Class B: small-group ($t= -4.61$, $p= .006$). The other two significant contrasts were related to low achievers in each class. Low Ss in Class B spent a significantly greater proportion of instructional time in sanctioned non-instructional activities than the low Ss of Class A: large-group ($t= -7.39$, $p= .000$) or the Class C: Individualized group ($t= 4.51$, $p= .001$). There were no differences, however, between low achievers of Class A: large-group mode and Class C: individualized mode ($p < .011$).

TABLE 18

DUNN-BONFERRONI PAIRWISE COMPARISONS,
SEPARATE VARIANCE ESTIMATES,
SANCTIONED NON-INSTRUCTIONAL

Comparison, Groups	df	Difference Between Means	Standard Error	t Value	t Probability (p<)
Achievement Level					
High - Low	27	-.04	.05	-.79	.432
High - Middle	27	-.02	.05	-.37	.710
Middle - Low	24	-.02	.05	-.41	.682
Classrooms (High Achievers)					
Cl. A - Cl. B	9	-.20	.10	-2.06	.066
Cl. A - Cl. C	8	-.09	.12	-.78	.453
Cl. B - Cl. C	4	.11	.10	1.09	.323
Classrooms (Middle Achievers)					
Cl. A - Cl. B	5	-.51	.11	-4.61	.006*
Cl. A - Cl. C	11	-.22	.08	-2.75	.019
Cl. B - Cl. C	7	.29	.12	2.35	.050
Classrooms (Low Achievers)					
Cl. A - Cl. B	8	-.56	.07	-7.39	.000*
Cl. A - Cl. C	8	-.05	.10	-.56	.587
Cl. B - Cl. C	9	.50	.11	4.51	.001*

*significant at p<.011

CHAPTER V

DISCUSSION

This study investigated differences in classroom time utilization by eighth grade students of three selected mathematics classes. Several hypotheses were examined, with the following findings:

1. It was hypothesized there would be no significant difference in time on-task between each of the pairs of achievement levels: high and middle, high and low, and middle and low. Three planned comparisons were performed to test the hypothesis. Two comparisons were significant ($p < .017$). It was found that high and middle achievers spent more time on-task than did low achievers. However, there was no difference in time on-task between high and middle achievers. The hypothesis that high and middle achievers would not differ from low achievers in the amount of time on-task must be rejected on the basis of the results of this study.

2. It was hypothesized that for Ss of high achievement, there would be no significant difference in time on-task between each set of teachers' classes--Class A: large-group mode, Class B: small-group mode, and Class C: individualized mode. Three planned comparisons were performed to test the hypothesis. The hypothesis was not rejected for any of the comparisons ($p < .011$).

3. It was hypothesized that for the middle achievement level group, there would be no significant difference in time on-task between each

set of teachers' classes--Class A: large-group mode, Class B: small-group mode, and Class C: individualized mode. Three planned comparisons were performed. In all cases, the hypothesis was not rejected ($p < .011$).

4. It was hypothesized that for the low achievement level group, there would be no significant difference in time on-task between each set of teachers' classes--Class A: large-group mode, Class B: small-group mode, and Class C: individualized mode. Three planned comparisons were planned to test the hypothesis. In all cases, the hypothesis was not rejected ($p < .011$).

5. It was hypothesized that there would be no significant difference in sanctioned non-instructional time between each of the pairs of achievement levels: high and middle, high and low, and middle and low. Three planned comparisons were planned to test the hypothesis. In all cases, the hypothesis was not rejected ($p < .017$).

6. It was hypothesized that for high achievement level group, there would be no significant difference in sanctioned non-instructional time between each set of teachers' classes--Class A: large-group mode, Class B: small-group mode, and Class C: individualized mode. In all cases, the hypothesis was not rejected. ($p < .011$).

7. It was hypothesized that for the middle achievement group, there would be no significant difference in sanctioned non-instructional time between each set of teachers' classes--Class A: large-group mode, Class B: small-group mode, and Class C: individualized mode. Three planned comparisons were performed to test the hypothesis. One

comparison was significant, middle achievers in Class A: large-group mode spent less time in sanctioned non-instruction than Ss in the Class B: small-group mode ($p < .011$). The hypothesis was confirmed for the two comparisons of Class A: large-group Ss with Class C: individualized group Ss and Class B: small-group Ss with Class C: individualized group Ss ($p < .011$).

8. It was hypothesized that for the low achievement level group, there would be no significant difference in sanctioned non-instructional time between each set of teachers' classes--Class A: large-group mode, Class B: small-group mode, and Class C: individualized mode. Three contrasts were planned. Two were significant ($p < .011$). Low achievers in Class B: small-group mode spent more time in sanctioned non-instructional activities than low Ss of Class A: large-group and Class C: individualized modes. Low Ss in the Class A: large-group mode and Class B: small-group mode did not differ in sanctioned activities.

Following is a discussion of the results for the hypotheses and a brief summary of the other important time variables related to these findings allocated time, instructional time, and adjusted instructional time.

Principal Dependent Measure: Time On-Task

The results of this study did support findings (Bloom, 1976; Good & Beckerman, 1978, Harris & Yinger, 1976) that individual students differ greatly in their use of classroom time. In the present

study, it was found that Ss of high and average achievement spent significantly more time on-task than low achievers. A significant difference between high and middle achievers was not established; however, a trend is implied in the descriptive data when comparing high and middle achievers of Class B: small-group and Class C: individualized modes. In both cases the high achievers were on-task 5 percent more than the middle achievers.

Another significant finding was that Ss of each achievement level spent the same amount of time on-task in each of the three classes. This finding at the secondary level is a contradiction of similar research reported at the elementary school level (Good & Beckerman, 1978; Rosenshine, 1979). The assumption that the direct instruction approach (teacher-led large-group) is the most effective mode for maximizing student time on-task was not supported in this study. Students of Class B: small-group mode and Class C: individualized mode were not less on-task. However, low achievers tended to vary in time on-task in each of the three classes. This finding could be related to the interaction of numerous teacher and student factors. The majority of low achievers in Class B: small-group mode spent a considerable portion of class time waiting in line for the teacher's help. During these periods, the Ss were allowed to socialize with others in line. Thus, the resulting effect of the wait was the Ss received task direction from the teacher and were possibly "socialized out," both of which may have influenced greater time on-task when the Ss returned to their seat. A few of the low achievers in Class B did spend a considerable proportion of class time at their seats off-task socializing and in sanctioned non-instruction-

al activities.

The majority of low Ss in Class C: individualized mode tended to remain in their seats more off-task than the Ss of Class B: small-group mode. However, only 3 percent of the off-task time for the low achievers of Class C was spent in socializing activities. It does appear for the low achievement Ss that Class A: large-group data represents the most reliable measure of time on-task for other comparison purposes.

Sanctioned Non-Instructional Time

Results of teacher sanctioned non-instructional activities provided important information to assess fully the effectiveness of student time utilization. An interesting finding was the lack of significant results when the achievement levels were compared across the teachers' classes. The three teachers represented in their approach to instruction a wide range of grouping patterns, instructional activities, pacing, and student and teacher transitions. It is conceivable that the limits placed on students' physical movement in the structured teacher's class (Class A: large-group) could have resulted in a significant difference in sanctioned non-instructional activities when making comparisons with the less restrictive teachers' approaches. Further research is needed to verify these findings.

The results of pairwise comparisons on the nests (simple effects) of each achievement level in each of the teachers' classes revealed three significant contrasts. Mean scores of middle achievers in Class B: small-group mode differed significantly with those of middle achiev-

ers in Class A: large-group mode, but middle achievers in Class C; individualized mode did not differ with middle Ss in the other two classes. The last two findings of importance were that low achievers in teacher's Class B: small-group differed significantly in comparison to low Ss of the other two classes. The mean scores of low achievers in Class C: individualized mode did not differ from those of low Ss in Class A: large-group mode. The data suggest, however, that all Ss in Class B: small-group mode and high and middle achievers in Class C: individualized tended to spend a considerable proportion of instructional time in sanctioned non-instructional activities.

One explanation for the significant findings is that Ss in Class B and Class C were allowed to leave their desks to retrieve materials and to individually approach the teacher for help.

The Class B: small-group Ss differed from Ss in the other two classes because middle and low achievers of Class B spent a considerable portion of class time waiting in line to talk with the teacher. As noted earlier, the teacher of Class B did not discourage students from waiting in long lines around her desk. The high achievers in Class B were more teacher-autonomous and able to use peers in the group to answer questions.

In Class C: individualized mode, nigh and middle achievers spent sanctioned non-instructional time most often in the interim activity of retrieving "flow charts" and textbooks from storage areas. The teacher of this class discouraged a large number of students from gathering around his desk. The result of this on the behavior of the low achievers was to remain at their desk in off-task activities. This finding supports

Peterson and Janicki's (1979) conclusion that low achieving students need greater direction and monitoring by teachers. This appeared to be also true of middle achievers in Class B: small-group and Class C: individualized modes.

Allocated Time, Instructional Time, Adjusted Instructional Time

Rosenshine (1979) suggested that studies on student time utilization should bear in mind that, "despite the importance of academically engaged time . . . the critical variable relating to student achievement is the number of academically engaged minutes per day." In the present study, the observer recorded the total number of minutes that the teacher allocated daily for instruction, the period was usually a set interval of time. Allocated time set the general limits in which student learning could occur. This time included activities of student's transition into the room, settling into the classroom routine, the teacher taking roll, or other such activities. Therefore, the observer judged daily when instruction had actually begun for the students. That is, time had been allocated for the student to begin working on the daily task. This period of time was adjusted to exclude the amount of time the student spent in sanctioned non-instructional activities. From here, the researcher was able to estimate the amount of time students spent daily on-task or actively learning.

It was found that the three classes did not vary greatly in the amount of daily allocated time. Allocated time ranged only two minutes per day among the classes (45-47 minutes). The three classes were also similar in the amount of instructional time that occurred

each day. Less than one minute separated Class B: small-group mode and Class C: individualized mode in instructional time (38.55 - 37.91). The Ss in both of these two classes were responsible for initiating learning activities. On the average, it took the Ss of Class B and Class C over seven minutes per day to settle into task learning after the class period had begun. Class A: large-group mode received over 42 minutes of instructional time per class period. In this class, the teacher controlled when the instructional activities began for the Ss. In Class A the instructional time began within four minutes of the allocated starting time.

Also recorded in this study was that Class A showed the greatest amount adjusted instructional minutes per day in comparison to Class B and Class C (38.83, 29.55, and 33.55 minutes, respectively). Although, as noted previously, the results of the planned comparisons indicated that the Ss in each achievement level and each class did not differ in adjusted instructional activities (time on-task and off-task).

Limitations of the Study

Among the major limitations of the study have been the failure to assess the motivation, learning style preferences, and achievement gains of the Ss, and the problem of operationally different teaching approaches not being applied in each of the classes. According to Klausmeier (1980b) implementing an instructional program in an academic course for each student requires that the teacher estimate the students' interests and motivation to learn the subject matter. In this regard, the teacher may provide a variety of printed, audiovisual, and three - dimensional materials to account for differences among individual students in learning styles. Other considerations are the students' preference of learning through individual, small-group, or large-group activities. It would have been useful if this study had attempted to systematically evaluate Ss perception

of self, peers, scholastic attitude and the teacher's approach to instruction.

This study attempted to assess time utilization of secondary students by observing normal student and classroom processes. It is conceivable that the findings of the study are confounded by teacher variables. The researcher found early in the study when conducting interviews with the school's mathematics staff that teachers did not vary their instructional approaches. That is, the teacher relied consistently upon one favorite method of instruction. Ideally, it would have been desirable to have teachers instruct with a variety of methods or to have randomly assigned the teachers to a selected approach. Had the students in each class been exposed to different teaching approaches, the results of the present study would not have been subject to teacher bias. However, this study was planned and carried out in the second semester of the school year. To have controlled for teacher instructional variables would have implied initiating a long educational program or placing other unreasonable demands on the teachers.

If the study had been of longer duration, it would have been advantageous to have assessed student time utilization and achievement throughout the school year. Entry level achievement and attitude scores could be coupled with measures of student time on-task and compared later against scores and measures recorded at the end of the school year. (Unfortunately, this study was unable to establish achievement gains or units of work completed by the students in relationship to the amount of time spent on-task).

The degree to which differences in the proportion of Ss in each achievement level and the number of males and females in each class influenced results must also be considered. Although the researcher had been assured by the selected teachers that Ss in their classes were a heterogeneous sample in regard to mathematics achievement, sex, and racial composition; findings revealed a disproportionate number of Ss in each category.

In summary, based on the results of this study it seems that the complexity of student and teacher process variables has a powerful influence upon time utilization in the secondary classroom. More valid assessment of the direct influence of teachers' behavior on student use of classroom time is needed.

Implications

In this study, the Ss as a combined group averaged 89 percent of the adjusted instructional time on-task. Although other information of this nature at the secondary level is lacking for comparison purposes, it can be concluded nonetheless that the teachers of each class observed were excellent in arranging instructional programs that permitted high student engagement rates. As suggested by the literature (Bloom, 1976; Klausmeier, 1976; Stallings, 1975), it should follow that if the instructional programs are maintained and improved upon, higher overall student achievement levels should result. Longitudinal data gathered

as part of the work of the Wisconsin Program for the Renewal and Improvement of Secondary Education could support this conclusion.

Another important factor contributing to student performance in the school studied may be due to the organizational structure and functioning of the Instructional and Advisory Units. Teachers in such arrangements are able to provide each other in the unit with meaningful information about the performance of many individual students. In this regard, teachers are able to share in providing remediation for problems and the task of monitoring student progress.

In this study, the teachers generally did not adjust their instructional mode to meet the individual characteristics of each learner. Results of the study suggests, however, that a multitude of instructional patterns and approaches could be utilized by the secondary teacher to "optimize" learning activities and experiences of each student in the classroom. Further research is needed to determine the effects of teacher education programs which encourage the arrangement of instructional strategies, methods and settings to meet the needs of individual students. Research is needed also to determine the effects of ongoing educational programs that take into account individual students' use of time, motivation, learning styles, and other personal characteristics. Longitudinal studies which trace the combined renewal and improvement efforts of secondary schools, universities, and educational laboratories in moving toward the organization and implementation of individual

educational programs for students will be highly effective in improving individual student achievement and the quality of education in secondary schools.

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APPENDIX A

Ten Comprehensive Objectives of the Wisconsin Program for the Renewal and Improvement of Secondary Education

COMPREHENSIVE OBJECTIVES FOR SECONDARY EDUCATION

Source: Klausmeier, H. J., Appendix A: Comprehensive and enabling objectives of the design for the renewal and improvement of secondary education. In H. J. Klausmeier, J. M. Lipham & J. C. Daresh, The renewal and improvement of secondary education: Concepts and practices. Madison, Wisconsin: Wisconsin Research and Development Center for Individualized Schooling, 1980.

COMPONENT 1: EDUCATIONAL PROGRAMMING FOR THE INDIVIDUAL STUDENT

Comprehensive Objective: (Part I)

An individual educational program of course work and other activities is arranged for each student each semester that satisfies the student's developmental needs and characteristics and that also meets district and state requirements.

Comprehensive Objective: (Part II)

An individual instructional program is arranged for the student in each course and other activity that is part of the student's total educational program that takes into account the student's aptitudes, interests, motivation, learning styles, career goals, and other personal and social characteristics.

COMPONENT 2: CURRICULAR ARRANGEMENTS

Comprehensive Objective:

A comprehensive and flexible curriculum is developed that meets state and district requirements and that facilitates educational programming for the individual student.

COMPONENT 3: EXPERIENTIAL LEARNING AND CAREER EDUCATION

Comprehensive Objective:

Career education is arranged for all student; experiential learning activities and/or work experiences in the community are arranged for each student who can profit from them.

COMPONENT 4: STUDENT DECISION-MAKING ARRANGEMENTS

Comprehensive Objective:

Students progressively assume more initiative for planning, implementing, and evaluating their programs and activities with a lesser amount of adult direction and control.

COMPONENT 5: EVALUATING STUDENT LEARNING AND EDUCATIONAL PROGRAMS

Comprehensive Objective:

The individual student's progress toward attaining his/her course objectives, the student's instructional program in each course, the student's total educational program, and the school's total educational program are evaluated systematically.

COMPONENT 6: ADMINISTRATIVE ARRANGEMENTS

Comprehensive Objective:

The school's administrative arrangements provide for cooperative planning and shared decision making by the persons responsible for implementing the plans and decisions that are made, mainly administrators, counselors, teachers, and students.

COMPONENT 7: ORGANIZATION FOR INSTRUCTION AND STUDENT ADVISING

Comprehensive Objective:

The faculty and students are organized into groups so that an effective educational program is arranged for the indivdual student each semester and advising is personalized.

COMPONENT 8: HOME-SCHOOL-COMMUNITY RELATIONS

Comprehensive Objective:

Effective communication and cooperative educational efforts between the school and the community are carried out as part of a program of home-school-community relations.

COMPONENT 9: INTERNAL AND EXTERNAL SUPPORT ARRANGEMENTS

Comprehensive Objective:

The environment for learning and instruction in the school and for work and other educational experiences in the community is enriched through the intellectual, technical, and material support provided by school and school district groups, and by external agencies, such as regional educational laboratories, the state education agency, intermediate agencies, teacher education institutions, and professional associations.

COMPONENT 10: CONTINUING RESEARCH AND DEVELOPMENT

Comprehensive Objective:

Student learning and personality development, instruction, advising,

administrative arrangements, and other educational processes become better understood and are improved through continuous research and development conducted by school personnel and cooperating individuals and agencies.

APPENDIX B

Observer's Manual and the Form for Recording Student Time On-Task

OBSERVER'S MANUAL

Special procedures have been developed for carrying out the observation system used to describe student activities in the regular classroom. This observation system is a modified version of models suggested by Webb (1979, 1978) and Becker, Englemann, and Thomas (1975). The present observation system has been developed to provide judgments of whether or not the student's classroom behavior can be coded as "on-task", "off-task", or "sanctioned non-instructional". Before beginning the observational process, the observer will familiarize him/herself with the following information.

Observation Procedure

The observer will be provided from the teacher in the class to be examined a student seating chart and a listing of students in the class. The entire population of listed students present in the class each day will be observed. The observer will randomly select "target groups" of four students each to observe at fixed intervals. This observational procedure is termed "time-sampling". This means that each target group (set of 4 students) will be observed independently from the rest of the class in sets of five minutes. The five minute set is broken into 20 second intervals. The observer will study the target group for 15 seconds and use the next 5 seconds to code and record students' behaviors on the Form for Recording Student Time On-Task. At the end of the 5 minute interval, the observer will move on to another target group and begin

the same procedure.

The observer will attempt not to disrupt the normal classroom process while undertaking the study. In all cases, the observer will be seated in the rear of the classroom before the class period begins. Whenever possible the observer will circulate around the classroom after instruction has begun and observe the interactions of the target group with the teacher, peers, and instructional materials. In no instance will the observer speak to the students or help the students on assigned tasks. At the end of the observation day, all recorded information will be tabulated for later tabling and rechecked to insure accuracy in coding and reporting of additional information.

Coded Student Behaviors and Other Information

During each day of observation, the students' classroom behavior and other pertinent information will be coded and recorded on the Form for Recording Student Time On-Task. The specific student behaviors to be coded on this form in the top one half of each 20 second interval are:

Time on-task is the amount of adjusted instructional time a student spent engaged writing, thinking, or discussing the instructional topic.

Code R if the student is engaged on-task writing. This student is writing in a workbook, on answer sheets, working at the blackboard, or calculating figures on other written materials. The student who is seen as on-task writing may momentarily pause to think, read a question, erase a mistake, or turn to the next page of problems. In these instances, on-task written (R) would be coded because written activities are the ongoing response mode of the activitiy under consideration.

Code V if the student is engaged on-task verbal. The student is asking or answering a question that is relevant to task learning. This would include oral recitation, discussions with the teacher or peers, or other modes of oral expressions that may be considered as important for task learning. When in group

discussion, if the student pauses to consider a response, takes time to correct an answer or waits his turn to speak in a group, then time on-task verbal is coded because it is the ongoing response mode at the moment. Engaged time on-task verbal is not coded if the student is talking to the teacher or other students about something other than the assigned activity.

Code C if the student is on-task covert. The student is engaged on-task covert when reading assigned material, listening to the teacher's lecture, measuring with a ruler, or using other manipulatives such as a calculator or cubed blocks. As is the case with other on-task codes, on-task covert is coded only when it is the ongoing response mode, not when the student pauses intermittently during a series of written or oral responses. On-task covert will be coded when the student is taking notes while listening to the teacher or group provide information. This behavior will be coded in those instances where the teacher or another student are discussing a topic and it is assumed that the target student is to be attending to this presentation. For example, if while the teacher is presenting the topic, the target student is looking out the window, on-task covert response will be coded in those instances where it appeared that the student's attention was drawn back toward the teacher. If the target student, however, gazes continuously out the window or focuses his attention on activities or persons other than the major task at hand for what is considered an excessive amount, then off-task response will be coded.

2. Time off-task refers to periods where the student is inappropriately disengaged for a mathematics task. This would include socializing, daydreaming, misbehaving, or aimlessly walking around the room during an instructional period. Usually these behaviors are those that the teacher would consider as inappropriate for task learning. Time off-task is a major component of adjusted instructional time.

Code O if the student is off-task. It is assumed that the student is daydreaming, socializing, behaving disruptively, or simply shuffling aimlessly through textbook pages. Clues to help in determining if the target student is off-task includes the student's eye movemement, previous habits, the ongoing activity, and other students close to the target student.

If the target student is reading comics, newspapers, or other materials not relevant to learning the assigned task, off-task is coded. Off-task is not coded if the student monentarily drops and picks up a pencil or other object, sneezes and wipes his or her nose, or such similar minute actions that do not disrupt the flow of task learning.

3. Sanctioned non-instructional refers to periods where the student is neither on-task or off-task. This behavior is a major component of total instructional time, but is reported separately from time on-task and time off-task findings. Behaviors of this category are termed sanctioned in that the teacher allows the target student to engage in the activity.

   Code I if the student is engaged in an interim activity. This code refers to student activities such as sharpening pencils, turning in and passing out papers, retrieving manipulatives or materials, setting up a game, and transition movements of the student toward the teacher or a group for instructional purposes.

   Code W if the student is waiting. Waiting refers to periods where the student has stopped working on a mathematics task because he is waiting for the teacher to correct a test, the group to finish their work, or for the teacher to respond to the student's raised hand. This code may also refer to when the target student finished his work early and no other activity is initiated by the teacher or student. The student may in this category be sitting quietly at his desk or socializing with a neighbor, the key to this code is that the behavior is sanctioned by the teacher. Waiting is terminated when another activity or other transitions are initiated by the teacher or the student.

   Code N if the student is engaged in non-mathematics activities. This refers to a wide range of organized classroom activities that disrupt the student from utilizing effectively time the teacher has set aside for instruction. This category includes announcements over the loud speaker, fire drills, sharing of stories with the teacher, going to the bathroom, or other related activities that the whole class might share in.

Teaching approach means each time the target student is observed the student or teacher grouping the student is in will be recorded on the Form for Recording Student Time On-Task. This information will be placed in the bottom half of each 20 second

interval on the form. The codes for this category are:

Code 1 if the student is engaged in individual activities or independent study. The student is working on his own at his seat or at the blackboard on assigned material and tasks. The student has been assigned a specific objective to accomplish, however, the code may be used when the total group of students is working on the same objective or activities. The intent of the activity is for the student to work individually.

Code 2 if the student is working in a small group (2 to 10 students). The teacher may or may not be leading the group in task learning. The student must be interacting with another before this code can be recorded. All the students in the group may be working on the same objectives or have separate objectives to accomplish. Within the group there may be heterogeneous or homogeneous grouping of students by ability.

Code 3 if the student is a member of a large group (11 to 36 students). A large group is described most frequently as a traditional teacher led approach to instruction. Large group activities are generally lectures, group discussions, flash card exercises, or recitation periods. The key element for this code is that the teacher is leading instruction and providing the direction for the group. The students may or may not all be receiving the same direction from the teacher.

Total Allocated Time is the amount of time that a school district or a teacher has allocated for instruction. In most classes, this period usually begins when the bell rings to start the class. In those instances when the observer has not been informed of of the period's starting time, the observer will assume the period began when over half of the students have entered the room. The period ends when the teacher allows the students to leave the room. This time is entered on the recording form as the clock time when the period began and ended.

Total Instructional Time is the amount of time per class period that the observer assumed active learning or teaching was occuring. This category is used to denote the total amount of class time the students spent on-task, off-task, and in sanctioned non-instructional activities. This period will be recorded on the observation form as the clock time at which it was observed instruction began and ended. This component will also be reflective of when the observer began to code student behavior in the 20 second interval blocks.

Total Adjusted Instructional Time is the actual amount of time per class period that the student could use for task learning. Adjusted instructional time is derived by subtracting sanctioned non-instructional time from total instructional time. That is, adjusted instructional time is the total amount of time that the student spent on-task and off-task, combined.

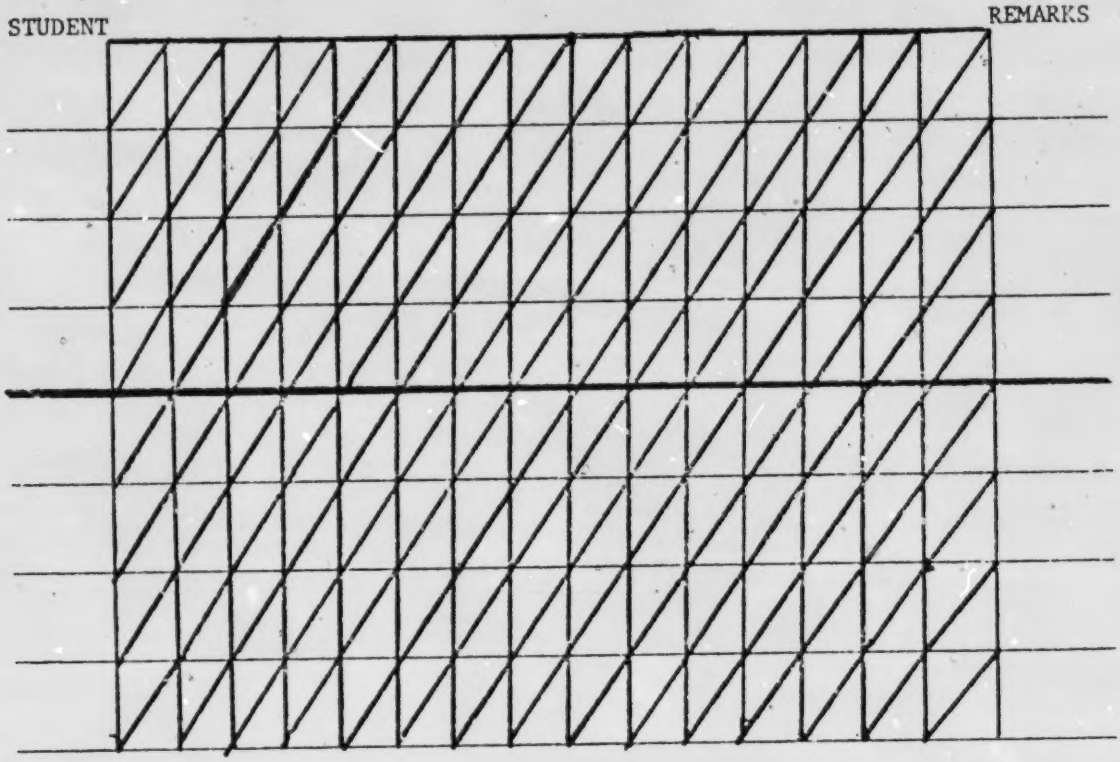
Also recorded on the observation form will be the date of the observation, the name of the teacher and subjects in the class and additional remarks.

FORM FOR RECORDING STUDENT TIME ON-TASK

Date:_____ Allocated Time Begin:_____ End:_____

Teacher:_____ Instructional Time Begin:_____ End:_____

STUDENT REMARKS



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